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QUEENSLAND AGRICULTURAL JOURNAL

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Contents

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Event and Comment

The Journal—Resumption of Publication.

FIRST published in July, 1897, *The Queensland Agricultural Journal* continued without a break until and including December, 1941, when, because of the war situation, it was deemed advisable to suspend its issue indefinitely. Changing circumstances have now made it practicable to resume the publication of the *Journal*.

To conform with the present-day needs of rural industry in Queensland, the *Journal* has been redesigned to extend its practical value to primary producers generally. It is intended that the publication should be definitely a farmers' journal, to which officers of each Branch of the Department of Agriculture shall contribute short, practical, and topical articles from month to month.

Although smaller in volume because of the wartime necessity for conserving paper, popular features of pre-war issues by which the "*Q.A.J.*" became known and appreciated as a periodical of practical informational value and handy agricultural reference, will be continued.

LIBRARIANS, PLEASE NOTE!

The publication of "THE QUEENSLAND AGRICULTURAL JOURNAL" was suspended in December, 1941, because of war conditions at the time. The last completed volume was Volume LVI.—Parts 1 to 6, July-December, 1941.

After the lapse of a year and a-half, publication of the JOURNAL is resumed with this issue. It will be observed that serial numbering of volumes is continued, the present issue being Part 1 of Volume LVII., or as now shown, Part 1 of Volume 57.

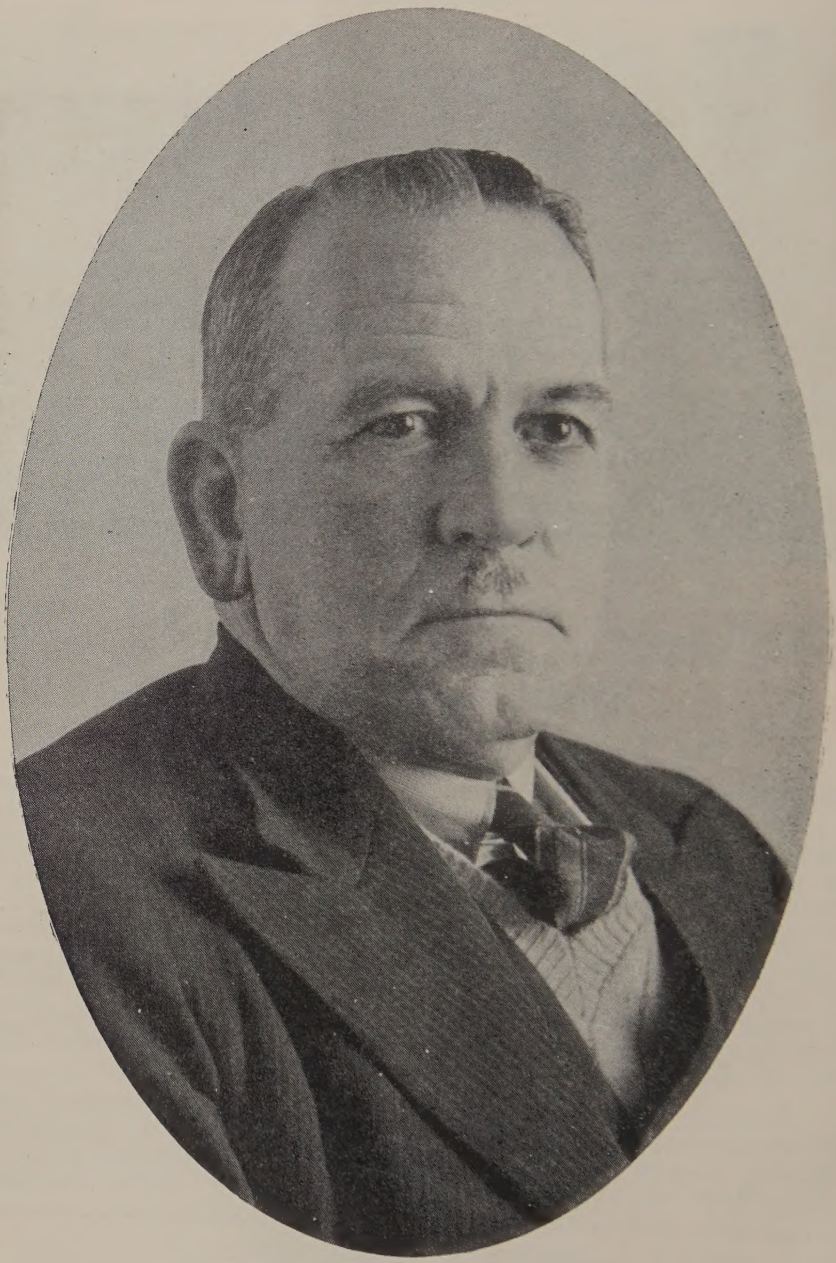

Plate 1.

HON. T. L. WILLIAMS, M.L.A.,
Minister for Agriculture and Stock.

PREFACE

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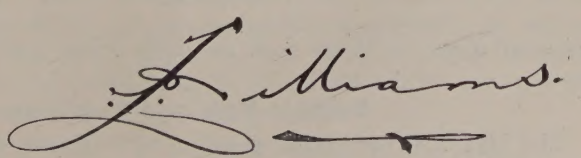
WHEN the publication of "The Queensland Agricultural Journal" was suspended in December, 1941, because of the hazardous war situation at the time, no one doubted the wisdom of the decision. The general situation has, however, changed so materially that a revision of policy in respect of departmental publications has become highly desirable.

We are faced with a food and raw material supply problem greater than at any other period in our history, while the difficulties of production and distribution are also without precedent. Cessation of imports, restriction of transport, and abnormal increases of population in certain zones have made it necessary to grow crops new to Queensland or new to particular regions. Consequently, many farmers are faced with the necessity of producing and harvesting crops with which they are unfamiliar. In such circumstances, there is a definite necessity for extending the advisory and informational services of the Department of Agriculture and Stock.

An inevitable result of wartime conditions is that greater quantities of primary products have to be produced by fewer men. Increased output is imperative, and this, in large measure, can only be attained by more efficient production. Now is the time, therefore, for increased guidance and stimulus by the Department. For that reason particularly, the re-appearance of "The Queensland Agricultural Journal" as a medium for the dissemination of information and technical advice to farmers is warmly welcomed.



Potato Culture.

C. J. McKEON, Director of Agriculture and Senior Research Officer.

PART I.

POTATOES can be successfully produced in many districts in Queensland under widely varying conditions of soil and climate; a close study of local conditions, however, is necessary to ensure success. The cooking qualities of potatoes grown in the State are equal to those of potatoes produced elsewhere in the Commonwealth, and in view of this and the fact that considerable areas of suitable land are available throughout Queensland, a much greater acreage could be devoted to this crop than has been the case in the past.

Provided soil and climatic conditions are suitable and good cultural methods are adopted, potato growing can be made a more remunerative proposition than most other crops. Growers who persist with potatoes and are not discouraged by an occasional reverse, as a result of disease incidence or low prices, find them one of the most profitable crops in the long run.

Time of Planting.

Growers in most potato-growing districts are fortunate in being able to produce two crops a year, the first of which, commonly known as the spring crop, is planted in August, the second, known as the autumn crop, being planted in February. In some districts which enjoy a partial immunity from frosts, plantings are carried out in July with a view to benefiting by the higher prices usually obtained for early potatoes. The main spring crop planting, however, is carried out during August, although in districts such as the Darling Downs planting may take place as late as September owing to the risk of late frosts occurring and injuring earlier plantings. Nevertheless, it is generally recognised that the earlier the spring crop is planted the greater are the chances of a heavy yield, providing, of course, that weather conditions are favourable. A crop planted late in spring may encounter humid weather and have a tendency to produce an over abundance of tops and a light crop of tubers. Similar unsatisfactory results may follow the use of an unsuitable variety. In North Queensland the time of planting is influenced by the incidence of the monsoonal rains and planting there does not take place until the wet season is over.

Suitable Soils and Rotations.

The ideal soil for potato growing is a friable, well-drained, alluvial loam, sufficiently rich in organic matter to absorb and retain moisture.

As a general rule, good lucerne land is also good potato land, but this is not invariably so, as lucerne can be grown successfully on the heavier types of black soil, which, unless under ideal conditions, are unsuitable for potatoes. Then, again, potatoes can be grown on some of the lighter sandy loams which could not be regarded as good lucerne land. Clay soils and soils which are badly drained and liable to become water-logged should be avoided, as not only are the chances of raising a crop small in such soils, but tubers of good shape and quality cannot be produced on them. Even on the best soils, high yields cannot be maintained, after potatoes have been grown continuously for a number of years, unless care be taken to preserve the condition of the soil by keeping up the supply of humus. This can be achieved by practising a rotation of crops and by ploughing in a green manure, preferably a legume, such as field peas for winter growth or cowpeas for summer growth. Farmyard manure, when available, is also excellent for this purpose and, like green manures, possesses considerable value as a fertilizer.

The fact that potatoes produce such satisfactory crops on well prepared virgin land, in which there is usually a good supply of organic matter, supports the belief in the necessity for maintaining the supply of humus by adopting sound farming methods. In practically all potato-growing districts a wide range of both summer and winter crops can be grown successfully, and accordingly no difficulty should be experienced in deciding on a crop rotation, to suit a particular locality.

Preparation of the Soil.

An early and thorough preparation of the soil is essential if the best results are to be obtained from any crop, but to none does this apply more so than to potatoes. Farmers who spend the extra time and labour required to bring the soil into first-class condition will be more than repaid by the improved yields obtained, especially if a dry spell is experienced during the growth of the crop. Under the most favourable conditions, good crops may be produced on land that has received a hurried and rough preparation, but in any district such conditions are likely to occur only at rare intervals, and consequently the necessity for thorough preparation of the land cannot be too strongly stressed.

The first ploughing should be to a depth of at least 9 inches, which will ensure that the seed, when planted, will have 4 inches of worked soil beneath it. The land should be left fallow for at least two months before planting, care being taken, in the meantime, to deal with any weed growth which may appear. The use of a spring tooth cultivator or other suitable implement will not only deal with weed growth, but will ensure that the surface soil is in good condition. Land prepared in this way will almost invariably be in sufficiently satisfactory condition at planting time to give a good germination of properly selected seed. If the usual practice of ploughing in the seed is not adopted, the land should receive a second ploughing, which should be at least 3 inches shallower than the first, just prior to planting.

Varieties.

The question of the most suitable variety to grow is one which the farmer will have to decide for himself, either as the result of his district's experience of potato varieties or after consultation with an appropriate departmental officer.

Carman and Factor are by far the most widely grown of the white-skinned varieties. They are high yielding and always command a good price on the market. Up-to-date also does well in some localities and comes next in order of popularity. Manhattan is at present the most popular and also the most reliable of the blue-skinned varieties In certain localities Guyra Blue also gives good results, but it does not do well in all districts. Satisfaction and Tasmanian Brownell are the most widely grown of the red-skinned varieties. Neither, however, should be planted in any quantity without a small-scale trial, as they do well only in certain localities.

Carman is among the State's most popular varieties and typical well-developed tubers of this potato always command a leading market price. There are distinct early and late strains of Carman potatoes and, furthermore, certain districts have a high reputation for the quality and trueness to type of the seed of Carman produced therein. Typical tubers of this variety have a white, smooth, or very slightly netted skin and are oval and slightly flattened in shape. The eyes are shallow but clearly defined and there is little waste in peeling. The variety yields well under favourable conditions.

The well-known Factor variety, which is commonly regarded as a strain of Up-to-date, appears to be adaptable to a comparatively wide range of soil and climatic conditions. The skin of its tubers is smooth and white and they are oval to elongate in shape, with shallow eyes. They are of good size, possess excellent table qualities, and the variety is consequently a good seller.

Another popular variety is Up-to-date, but it is not so well suited to all potato-growing districts as the three varieties already discussed. It makes tall, vigorous, semi-erect growth, and the leaves are large and of medium green colour. Its tubers are oval-shaped and have a smooth or sometimes slightly rough white skin. The eyes are shallow and are usually grouped at one end of the tuber.

There are two strains of the Manhattan variety—namely, early and late. Tubers of the common early strain are deep purple in colour with a white mottling which seldom appears in the late strain. This variety is one of the best in so far as yield is concerned and it is renowned for its hardiness and keeping qualities. Consequently, it can be grown successfully over an extensive range of soil and climatic conditions. A characteristic of the variety is its consistent ability to produce tubers of a good marketable size. The tubers are usually elongated and slightly flattened in shape, and the flesh is particularly white and close textured. The tuber eyes frequently tend to be deep and numerous but are evenly distributed.

Guyra Blue is a blue-skinned potato with white blotches, which somewhat resembles Manhattan; it is, however, usually slower in maturing than that variety. Guyra Blue plants are tall, spreading, and fairly open. Its tubers frequently tend towards a rounder shape than those of the Manhattan variety.

Several strains of the Brownell variety exist, but probably the most popular is the Tasmanian Brownell. It is particularly suited to Queensland coastal districts and under optimum conditions makes very rapid growth. The tubers of this variety are large and round and have a

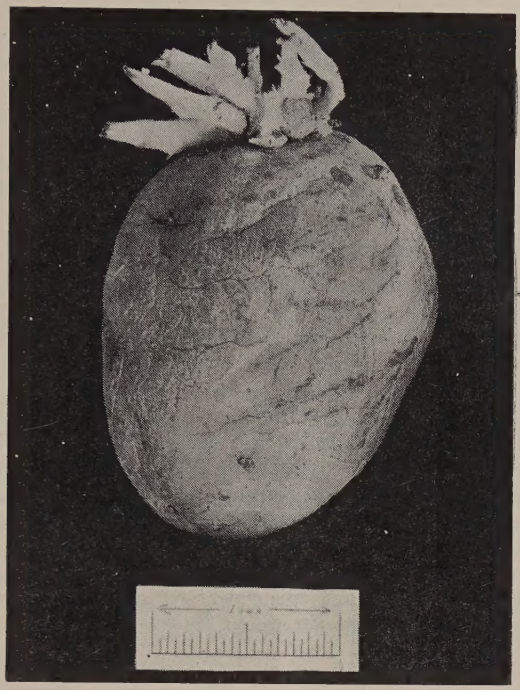


Plate 2.

WEAK, EASILY DAMAGED SHOOTS, THE RESULT OF INSUFFICIENT LIGHT.

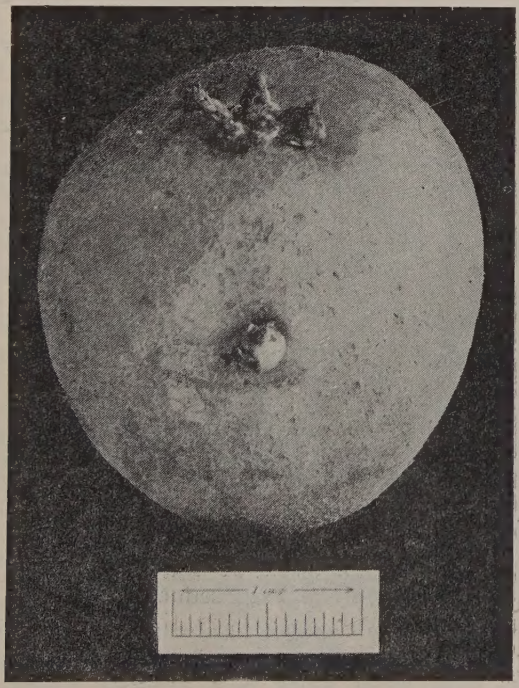


Plate 3.

SHORT, STURDY SHOOTS, THE RESULT OF EXPOSURE TO LIGHT.

rough red skin and keep well in storage. The tuber eyes are inclined to be deep, but are not very numerous, and the shoots are invariably a bright pink colour.

Bismarck is an early variety and is quick maturing. Its elongated tubers have a smooth white skin, and have numerous rather deep eyes, which are blue in colour and elliptical in shape. The crescent is long and clearly defined and the eyes are evenly distributed. This variety is popular in certain districts only.

Satisfaction, which is closely related to the Tasmanian Brownell, is a particularly attractive potato and is a red-skinned variety of good type and quality. Its tubers are large and round; they possess few eyes and keep well in storage.

Seed.

Seed has to be imported from the southern States for the spring crop, as locally-grown seed is unavailable for that crop, and every effort should be made to secure the imported seed supplies from a reliable source. It is far better to obtain seed true to the name of the variety which is known to suit the locality in which the crop is to be grown, even though it may cost a little more, rather than to obtain a cheaper line of seed which may turn out to be anything but the desired variety. Certified seed should be obtained wherever possible.

Providing the spring crop is planted early, seed from it can be used for planting the autumn crop in February. The grower should carefully select the tubers to be reserved for that purpose. Unfortunately, it is a common practice to use tubers which are the remains or culls from the crop after all marketable table tubers have been sold. Although they may be of a desirable size for planting the autumn crop, for which whole seed is generally used, it is an undesirable practice and one which has the effect of reducing yields. Many of the tubers so selected for planting will almost certainly have been produced by weakling or diseased plants, which did not produce tubers of marketable size.

The general practice in the case of other important crops is to select seed only from the most desirable plants and the same care should be devoted to the selection of seed potatoes. Growers will be fully compensated for the extra time and labour involved in selecting their seed requirements only from healthy plants which produced a reasonable number of tubers, the majority of which were of good type and of marketable size. The tubers selected for seed purposes should be stored in a cool, well-ventilated room, and should be spread out in shallow layers to promote the development of short, sturdy shoots (Plate 3) which will not rub off readily when handled and which will produce strong, healthy plants. A further advantage of storing in this way is that the tubers are less likely to rot than when stored in heaps or deep layers, and any which show signs of disease can readily be detected and immediately removed.

Seed for the spring crop may be cut, but this practice is not advisable in the case of the autumn crop, as hot, wet weather is frequently experienced during February and consequently cut seed is likely to rot in the ground. When cut seed is used, the seed should be cut a day before planting in order to allow the cut surfaces to dry. Sprinkling the cut surfaces with wood ashes is a practice which is frequently adopted and is a good one.

The best manner in which to cut the seed potatoes (Plates 4, 5, 6) will, in large measure, depend on their size, but as a general rule the smaller tubers should be cut in half lengthwise, and in the case of somewhat larger tubers the stem end should be cut off at about a third of the length of the tuber, the remaining portion being cut through the centre lengthwise, thus making three portions for planting. Still larger tubers should be cut into four sets of approximately equal size. Any tubers which are not perfectly sound, or which, on being cut, show a suspicious-looking discolouration, should be rejected.

Planting and Cultivation.

Although machines are available for planting potatoes, the general practice is to plough the seed in, the field being reploughed for that purpose, and the seed planted in every third or fourth furrow, according to the width of the plough cut. This practice has much to recommend it, as the soil and the seed in the planting furrow are not allowed to remain uncovered for any length of time, the planting and covering of the seed being practically simultaneous operations. The seed potatoes are spaced at an even depth and distance apart, the usual distance between them being 15 inches in the furrow with a planting depth of 5 inches. They should be planted on the side of the furrow to prevent the horses tramping on them, as would be the case were they planted along the bottom of the furrow. The usual distance between rows is 30 inches. As soon as possible after planting, the land should be harrowed to level the surface soil and thus conserve the soil moisture.

Plate 4.
Tuber Suitable for Cutting into Two Sets.

Plate 5.
TUBER SUITABLE FOR CUTTING INTO THREE SETS.

Plate 6.
TUBER SUITABLE FOR CUTTING INTO FOUR SETS.

The first cultivation should be carried out as soon as the plants appear above ground. A light tine harrow, preferably a lever type with the tines set slightly back, is the most suitable implement for that purpose. Such cultivation will not only break up the surface soil which may have become slightly caked as a result of rain following planting, but it will also destroy any weed growth which has sprung up between the plants. This will be the best opportunity for eradicating such weed growth, as all future cultivations can be carried out only between the rows. The number of inter-row cultivations will depend on seasonal conditions, but these should be sufficient to keep weed growth in check and at the same time keep the surface soil in a friable condition. Care should be taken to adjust the scuffler so that the tines do not damage the roots of the plants.

When the plants reach the flowering stage they should be hilled; an effective and popular way of doing this is by fitting hilling attachments to an ordinary scuffler. The main advantages to be derived from hilling are that it prevents tubers, which might otherwise have been exposed, from becoming discoloured, and it also affords some measure of protection against the potato tuber moth.

During growth, every reasonable precaution should be taken to protect the crop against an attack of Irish Blight, and where there is a likelihood of this occurring—i.e., during cool, showery weather—regular spraying or dusting should be carried out as a preventive.

Potato culture is dealt with fully in a recent bulletin, "Potato Growing in Queensland," which also deals with pests and diseases of potatoes. This bulletin may be obtained on application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

BUSHEL WEIGHTS.

For the information of farmers, following is a list of bushel weights:—

	Lb. per bushel.		Lb. per bushel.
Barley	50*	Peas	60*
Beans	60*	Pollard	20*
Bran	20*	Prairie	20
Cowpeas	60*	Rape	56
Grass Seeds	20	Rhodes Grass	20
Lupins	60	Rye Corn	60*
Maize	56*	Rye Grasses	20
Mangel	20	Setaria	60
Meals	20	Sorghum	60
Millets	60	Soy Bean	60
Oats	40	Tares	60
Panicum	60	Vetches	60
Paspalum	20	Wheat	60*

* Indicates the legal standard as fixed by "*The Weights and Measures Act of* 1924."

The ton is fixed at 2,240 lb. except for bran, pollard, and flour, which shall be 2,000 lb.

It should be noted that the Imperial bushel as used in Australia contains 2,218·2 cubic inches, whereas in the U.S.A. it is known as the Winchester bushel and contains 2,150·4 cubic inches.

Early Preparation of Grassland for Cotton.

L. M. HODGE, Senior Instructor in Cotton Culture.

IN many districts the carrying capacity of much of the older established grassland has become so low that renovation is urgently needed. This "running out" of grass is caused largely by overstocking, which exhausts the vitality of the better grasses, and to the gradual depletion of plant foods in the soil.

Experiments and demonstrations have shown that the best way to renovate a worn out pasture in the farming districts is to practise a rotation. This involves ploughing and cropping to something else for two or three years. Cotton appears to be an extraordinarily suitable crop to use in rotational renovation of worn out pastures in the cotton growing districts in that:—

1. It produces its heaviest yields on cultivations in the first couple of seasons following grassland.
2. It is notably drought resistant.
3. It has an assured market at a guaranteed price.
4. It is urgently needed for the country's War Effort.
5. The resown pasture flourishes when following cotton.

The question arises as to the best manner of preparing old grassland for the cotton crop.

Time of Ploughing.

The best time to plough grassland for cotton growing in the districts south of Proserpine is near the end of the summer wet period. It has been shown, however, that appreciable increases in yields over those produced on old cultivations may still ordinarily be expected where cotton follows grassland that has not been ploughed until late autumn or early winter.

Where circumstances prevent ploughing at the end of the wet season, it is advisable not to plough under a considerable amount of grass. Normally there is not sufficient moisture in the soil during the late autumn and winter to enable the soil organisms to decompose a large amount of the old dry grass that is usually prevalent at that period of the year. Consequently, if a big body of old grass, especially coarse material such as old Rhodes grass, is turned under in the winter, a very open seed bed is usually obtained. Unless an exceptionally good

planting rain is experienced, such a seed bed contributes to poor germination of the cotton seed, which will be followed by dying off of the cotton seedlings if frequent falls of rain do not occur. The lack of decomposition of the large body of turned under grass may also result in a deficiency of plant foods being experienced by the cotton plants during prolonged dry periods when they are heavily laden, especially if they are grown on soils of low fertility.

It is better, therefore, where ploughing is not done until May or June to select only grassland which has been closely grazed off so that just a moderate amount of grass stubble and weeds will be ploughed under. Given normal winter or spring rainfall a suitable seed bed can be prepared with a couple of disc harrowings and then a spike tooth harrowing following the planting rain to make a nice mulch for the planting operations. Such a seed bed will be firm enough to allow of a good germination being obtained yet will be sufficiently open to prevent any run-off of storms up to 1 inch. There will also be deeper penetration of rainfall in such seed beds than in old adjacent cultivations, thus providing more subsoil moisture for the cotton crop during stress periods.

Depth of Ploughing Grassland.

An average depth of approximately 6 inches appears to be a suitable ploughing of grassland for cotton-growing. Where the ploughing is done at the end of the wet season sufficient turn under of the long grass is obtained with this depth to rot the grass. A later cross-ploughing and a couple of disc harrowings will then prepare a suitable seed bed. For the later ploughings of the closely-grazed areas, the one ploughing of 6-inch depth is ample, providing the land is afterwards double disc-harrowed. Where a disc harrow is not available a cross ploughing will be required in about a month's to six weeks' time from the turning under of the grass, depending on the amount of moisture in the soil.

Value of the Grassland-Cotton Rotation.

The results obtained in experiments and commercial plantings over a series of seasons have indicated that it undoubtedly pays to plant cotton on land in the first or second season following the breaking up of grassland. Not only is there a greater supply of moisture provided, but there is also a better balance of plant foods available for the cotton plants. In addition, where early ploughing of the grassland is performed, there is definitely less weed and grass growth to combat during the growth of the cotton plant. The costs of cultivation are thus reduced and, as in most seasons, an increase in yield of cotton is realised compared with old cultivations—as much as 700 lb. of seed cotton per acre having been recorded—an appreciable reduction in the cost of production per lb. of seed cotton is also achieved.

Benefits are also realised in the grassland re-established following two or three seasons of renovation by cotton-growing. The cultural operations restore suitable soil conditions for profitable growth of grass of high quality for three or four seasons. A decline in both yield and quality of the grass occurs after that period. The land should be then rotated once more to cotton-growing for a couple of seasons.

Practice the grassland-cotton rotation—it increases the yields of both pasture and cotton.

Pruning Deciduous Fruit Trees.

H. ST. J. PRATT, Senior Instructor in Fruit Culture.

PRUNING has as its object the production of regular annual crops of good-sized commercial fruit over as long a period of years as possible. Guiding principles are—

1. If too great an amount of bearing wood is left, the tree will set an over-burden of fruit and will be weakened in consequence; and
2. If too little bearing wood is left, the result will be rank and excessive growth of wood with a light crop of large and poor quality fruit.

With a little experience, the orchardist will soon be able to steer a safe course between these two extremes; and by combining good cultivation and the maintenance of soil fertility with his pruning, obtain maximum results from his trees.

The Apple.

When trees are allowed to grow unpruned, it is their habit to fruit right up to the leaders; consequently, the branches are broken down with the weight of fruit, the trees fail to put on growth, they bear a heavy crop every two years and very little in the intervening years, and their commercial life is appreciably shortened. The trees do not die, but they do not pay.

The apple tree bears fruit on both laterals and spurs on the leaders. More and better fruit is, however, produced from laterals which can be kept growing, but spurs multiply and become weaker every year, necessitating tedious spur pruning. Therefore, lateral fruiting should be stimulated. During pruning, practically every lateral will require the operator's attention. Most of the previous year's laterals should be shortened. Some carrying spurs may require shortening back to a single spur to produce new growth after the fruit has set; in turn, this growth should be shortened in the following year to keep the tree growing. When a lateral remains unshortened, it bears an apple at the terminal bud and then develops spurs as far back as the vigour of the tree will permit. A 12-inch lateral would probably develop four spurs; the remaining buds would probably become barren and that lateral would cease to develop. If, on the other hand, the lateral were cut back to 6 inches or 4 inches in length, according to its strength, the terminal apple would be lost, but in the following year the top bud would put on

Plate 7.
Granny Smith before Pruning.

Plate 8.
Granny Smith after Pruning.

strong growth, the second a weaker growth, and the third a "dart," and the next two or three buds would develop into spurs, all capable of bearing good fruit, which would be close to the leader or subleader with a desirable growth beyond the fruit.

In fruit trees, the last or top buds in each leader and lateral always get the most sap, the second bud gets less than the first, the third less than the second, and so on. There is, however, rarely, if ever, enough to develop all the buds on a tree, and the necessary art of a good pruner is to be able to make a quick mental calculation and know how many buds on each lateral are capable of development, and to leave only that number of buds.

The main leaders of the trees should be well defined, and nothing should be permitted to interfere with their growth. It is preferable to allow them to grow slowly upwards and slightly outwards with sturdy limbs well supplied with fruiting laterals, than to run the tree up quickly by long pruning with barren spaces devoid of laterals.

In training the trees, care should be taken not to develop too great an outward spread of leaders before the trees come into bearing. The weight of fruit will spread the leaders naturally. Too great a spread will necessitate the use of supporting props during the fruiting season.

The English or European Plum.

Many orchardists in the Stanthorpe district condemn the English plum as unsatisfactory, but the poor results obtained are often due solely to incorrect pruning.

The fruit of the English plum is generally borne on spurs on two-year-old laterals, and, because of this, the method of pruning is different to that of, for example, the peach, which bears its fruit on one-year-old

laterals. On the leader growth of each year, the plum produces a number of laterals. If these were all left untouched, they would produce, the next year, a very large crop of undersized fruit, and no provision would be made for fresh laterals to replace the old ones for the following year. The result would be, after three years, that only a few fruits would be produced at the extremities of the old laterals, 3 feet or more from the leaders. To avoid this, the correct treatment is to leave every alternate lateral the full length to produce fruit the following year; the others should be cut out at their bases and fresh laterals will then grow for the following year. As soon as the laterals have fruited and become barren, they should at once be removed to encourage fresh lateral growth.

The best fruiting woods are two-year-old laterals about 12 inches long. Very strong laterals should always be completely cut away, when the dormant buds at their base will produce new laterals. Should there be any very long laterals which make the pruned tree look shabby, they can be tipped a little, but not too much; otherwise they will only make fresh wood growth which will take another two years to fruit.

A tree which has been incorrectly pruned over a number of years and has become unprofitable can be brought into good fruiting in two or three years. Such a tree would have a lot of old laterals which should not be present. They should not be all removed, however, in the one year. As a general guide, up to one-third should be removed at their bases, another third cut back to the last growing shoot, and the balance left to produce the coming crop. In the following year the procedure should be repeated, and in three years the tree will be renovated and will, during the process, become productive.

The Japanese Plum.

The Japanese plum is a very profitable tree to grow in the Stanthorpe district, provided it is correctly pruned and the fruit is kept well thinned out. Most of the good varieties are very heavy bearers and, unless controlled by hard pruning and thinning, the fruit is of small size, resulting in too great a strain being put on the tree. The best fruit is borne on two-year-old laterals.

In pruning, care should be taken to ensure a regular supply each year of fresh laterals to replace the old ones, the spurs of which have been weakened by cropping. The most common mistake is the leaving of too much fruiting wood because, to be profitable, the fruit should be of large size. At least half of the one-year laterals should be removed entirely. If this is *not* done all the laterals on the leader growth of that year will always be the same age, whether it be one, two, three, or four years, and there will be no provision for renewals. Laterals up to 12 inches in length should be left uncut. Some pruners are inclined to tip everything, which is quite unnecessary and really defeats the object. All strong growths, other than the growth from the terminals of the leaders, should be suppressed entirely; laterals of more desirable thickness will always take their place. At the same time, an entire lack of strong growths should be regarded as a danger signal for, as previously stated, unless Japanese plums are kept growing they soon die.

The Peach.

The peach, of all deciduous fruit trees, is one that from its mode of growth and bearing requires constant pruning to maintain it as a

shapely, thrifty, and productive tree. The sap tends to flow strongly to the extremities of the shoots, more so than in any other deciduous fruit tree, and buds which do not push and form shoots in the first season after their formation are often lost; they cannot, as in many other trees, be easily stimulated into growth. Hence it is that the lower parts become so rapidly denuded of young wood and that trees improperly pruned, and more or less left to themselves for six or seven years, are to some extent worn out or useless. The fruit is borne only on the wood of the preceding year, and every part destitute of such wood is practically worthless; consequently one of the great objects of pruning is to keep all parts of the tree supplied with a regular and constant succession of annual bearing shoots.

Examination of a fruit lateral will show that it has developed at least one or two wood buds at the base, and also at the tip with fruit buds between. If that lateral were not pruned, the fruit buds would produce a lot of small fruit, while one or two wood buds at the tip would make new shoots. These growths would, however, necessarily be very weak, because of the absorption of energy by so much fruit below them. For the next season the fruit would be borne on the weak growths and there would be a long barren space entirely devoid of young shoots or living buds between the fruits and the leaders. It is in this way that the interior and lower parts of the trees soon become degarnished.

If, on the other hand, the lateral were pruned by cutting away about half its length, thereby removing the wood buds at the tip and a number of fruit buds, the sap would be concentrated in the lower part of the lateral. The fewer number of fruit buds would produce large and fine fruits, while usually two vigorous young shoots would be produced from the wood buds at the base to bear fruit next season. In this way, regular uniform crops of good saleable fruit are obtained and a constant succession of young shoots is kept up.

In the following year the procedure should be to remove the portion of wood which has borne fruit, leaving the two young shoots; and of these, the top one or the one further away from the leader should be left full length, or shortened only slightly, to produce fruit. The other should be shortened by half its length, in order to produce the new wood for the next year.

Pruning, the next and subsequent years, should follow along these lines and by this method a healthy lateral can be kept producing for four or five years by which time a new shoot will probably burst out at the base; the old lateral can then be entirely removed, the new shoot shortened, and the procedure repeated.

These are general pruning rules for peaches, but modifications are at times advisable. For example, it is not always necessary to cut *every* lateral and some may be left their full length, but they should be cut away the next year as explained.

Laterals should be well spaced, for if there are too many, small fruit and too much foliage will result. Overcrowding results in laterals being poorly developed through lack of sunlight.

In the case of neglected trees, laterals may be found bearing fruit 2 feet away from the leaders. To correct this and bring the trees back to normal, the laterals should be severely cut back to force the dormant

buds at the base into growth. As soon as the new shoots develop, or even as soon as the dormant buds swell and show signs of life, the old laterals should be removed. At the next pruning the new laterals should be shortened by half for the first year; subsequent years' pruning will then follow along the general lines described previously.

With vigorous young peach trees five or six years old, it is generally not advisable to cut the terminals of the leaders back to well-developed wood buds, but to cut back to laterals. If cut to strong wood buds the leaders will put on another 5 or 6 feet of rank growth at the expense of the fruiting laterals below, whereas if run out to a fine point by cutting back to a lateral, the latter will act as a reducing joint and the sap will be dammed back and fruiting laterals will be forced out along the main limbs.

To rejuvenate trees with long barren leaders resulting from bad pruning, the leaders should be cut back to a lateral and fresh laterals will be forced out along the barren spaces. On no account should the leaders be cut back leaving bare stumps.

Care is necessary to control the growth of rank water shoots which may smother desirable fruiting wood but, at the same time, summer pruning should be very light.

The Apricot.

Correct pruning of the apricot is most important. Although a portion of the crop is produced on one-year-old lateral wood, most of it is borne laterally on spurs which are not long lived—about three years. Accordingly, the object when pruning should be to provide for a continual renewal of fruiting wood. Observations will show how hard each individual tree should be pruned, remembering that if pruned too hard, a lot of rank unfruitful wood will result and, if too lightly pruned, the trees will overbear, and the fruit will not reach a commercial size.

The vigour of the tree should be retained at all cost. Care should be taken to see that the spurs and comparatively thin laterals which bear the best fruit have plenty of sunlight, otherwise they will be killed outright.

Summer pruning is very necessary with the apricot. Apart from admitting the light necessary to mature the fruiting buds for the next year, it saves a severe pruning later which the apricot definitely dislikes. After the crop has been harvested, the very strong vegetative shoots on the main limbs should be removed and the leaders defined by thinning the growth at the top of the tree—the removal of this rank growth results in the sap being transferred to more profitable channels, and not being utilised in producing a lot of superfluous wood to be cut off at the next winter pruning.

All large pruning cuts should be protected with a coating of paint or coal tar to prevent the entrance of wound parasites.

The apricot is a very vigorous feeder and weeds are never seen growing near it in the orchard, therefore, to obtain the best results, soil fertility should be maintained by green and artificial manuring from the time the trees are planted.

The Pear.

Like the apple, the pear bears fruit on both laterals and on spurs on the leaders, and similarly, therefore, the pruning of mature trees is very much the same as that of the apple, except that with the latter, care has to be taken to prevent overcropping with resultant lack of growth and vigour; whereas, with the pear, if the laterals are shortened too severely rank wood growth with very light cropping will result. To prevent this short laterals should be left uncut to develop fruit spurs. In brief, provided the tree is growing normally, the pruner should cut to a spur and not to a fruit bud.

VEGETABLE PRODUCTION

Cabbage Growing.

C. N. MORGAN, Field Staff, Fruit Branch.

CABBAGE is among the more important vegetables required for both the domestic market and the Armed Services.

Cabbage is naturally adapted to cool climates and is, therefore, more favoured as a winter crop in Queensland. However, by the selection of suitable varieties, the season of production may be extended. In the coastal districts, production during the hot months of the year is usually difficult, but in the regions of higher altitude in the southern portion of the State, notably around Stanthorpe, summer production is heavy; therefore, it should be possible to produce fair crops of cabbage in Queensland practically the whole year round.

Seed-Beds.

The seed should be sown in beds of well-drained, deeply and thoroughly worked soil. If the soil in the beds is heavy, it may be improved by adding sand and decayed vegetable matter; if it is poor

Plate 9.
A FIELD OF WELL-GROWN CABBAGE, REDLAND BAY, NEAR BRISBANE.—Note overhead irrigation system.

and sandy, the addition of loamy soil or well-rotted manure is beneficial. The soil for seed-beds should not be too rich; otherwise the young plants find their food too easily, do not develop a good root system, and are soft and may not be easily transplanted. If, on the other hand, the soil is very poor, a small quantity of fertilizer may be added to it about a week before sowing the seeds.

After raking the surface of the bed to make it smooth, it should be firmed with a flat board, and the seed then sown thinly in shallow drills, not more than ½ inch in depth and about 4 inches apart. After sowing the seed the surface of the bed should be mulched with well-rotted leaf mould, in order to retain the moisture in the soil, which is necessary for the germination of the seed. Approximately 4 oz. of seed will provide enough cabbage plants for one acre.

Seed beds should be watered regularly, otherwise the growth of the young seedlings will be checked, resulting in unsatisfactory plants. When large enough to handle, the seedlings should be thinned to about one inch apart; for, if they are grown too thickly, they develop into long, spindly, weak plants.

If it is very hot during the middle of the day, shading may be necessary, but this shade should be removed entirely as soon as the plants are strong enough to withstand the heat. Over-shading also produces long, spindly plants, which are soft and difficult to transplant.

Transplanting.

In about six weeks the young plants should be large enough for transplanting. About two or three days before transplanting they should be hardened off, by withholding water. Immediately before transplanting, the plants may, however, be given a good watering, as this will facilitate their removal from the seed-bed without excessive injury to the young rootlets. For preference, transplanting should be done during cloudy or showery weather, but if weather conditions are unfavourable, the young seedlings should be watered in; and, as a further precaution, the top half of the leaves cut off to lessen evaporation of moisture from the plants until the new root system is firmly established. At all times during transplanting the roots of the young plants should be kept damp, and this may be done by standing the plants in a bucket containing a puddle of soil and water.

In planting, usually a hole is first made in the ground with a dibble—which can be made by pointing an old handle of a spade or digging fork; this hole should be only deep enough to allow the roots of the seedling to reach the bottom. A little earth is turned in and the plant then drawn slightly upwards before pressing the soil firmly around it. This ensures that the main root shall not be doubled up.

The rows should be not less than 2 feet 6 inches apart, and the plants set out at least 1 foot 6 inches apart in the row.

Fertilizing.

The application of chemical fertilizers will do much to ensure quick and successful growth of cabbage. Before the war the Depart-

ment of Agriculture and Stock issued formulæ for the guidance of growers, by which they obtained the ingredients separately and mixed their own complete fertilizers; but, because of the war-time shortage of particular fertilizers, and the ban on the sale of certain straight fertilizers, these departmental formulæ are not now being issued. The commercial houses handling commercial mixtures, however, have good complete fertilizers for cabbage and other vegetables, and they may be purchased with confidence by growers. The grower should, however, first get his permit to purchase through the Department of Agriculture and Stock.

Whilst the rate of application of fertilizers varies in different districts, and actually on different farms—each experienced grower having his own views on the matter—as a general guide 10 cwt. to 15 cwt. to the acre of a complete mixture may be applied. The method of application is to broadcast along the lines where it is intended the rows of cabbage shall be, and to scuffle the fertilizer in a week or more before planting.

If considered necessary, after about four weeks' growth, a side dressing of from 8-10 cwt. to the acre of a quick-acting complete fertilizer may be given. At hearting, a dressing of 2-3 cwt. of sulphate of ammonia or nitrate of soda will also be of considerable advantage.

For successful cropping, cabbage should be grown quickly. Therefore, on no account should growth be allowed to be checked. It is only possible to ensure continuance of growth by regular cultivation, watering when the weather is dry, and taking care that the plants do not lack an ample food supply.

Varieties.

Selection of the right varieties for different times of the year is important. In coastal districts winter planting types should be early and quick maturing. Seed of the early varieties is sown in the autumn, but the main crop varieties are sown between August and December.

Recommended varieties are:—

Early.—*Early All Head, Early Drumhead, and All Seasons:* All of these varieties are large, early, and quick growers.

Main Crop.—*Succession* is the most popular variety, and may be grown at almost any time of the year, and in practically every district; it is a good, large Drumhead type.

Drumhead is also a good variety; it is hardy, slightly larger than Succession, and matures a few weeks later.

Marketing.

Cabbage should be marketed as soon as practicable after cutting, and only good firm-hearted vegetables should be sent in. Care in handling is essential, and when placed in bags for railing at least some of the older outside leaves should be allowed to remain, as protection for the hearts against bruising, and the heads should be packed in the bags as firmly as possible.

APPLIED BOTANY

The Sword Bean or Scimitar Bean and the Jack Bean.

C. T. WHITE, Government Botanist.

SEVERAL specimens of these plants have been received recently for identification and information regarding their edible qualities. Both have been cultivated in Queensland for some time. The Sword Bean or Scimitar Bean seems to be more abundant in cultivation than the Jack Bean, although it is regarded as of inferior quality. Seeds of either variety are not generally stocked by nurserymen.

The two beans are very similar, and by some botanists are regarded as the same species. The accompanying illustration and notes should help in recognising the differences.

The Sword Bean or Scimitar Bean.*

All the varieties known in Queensland are climbers. The leaves are composed of three large leaflets. The flowers vary in colour, but are mostly lilac, large and pea-shaped. The pod is 10-14-seeded, the valves becoming hard and somewhat woody when ripe. The seeds are red or white with a large brown hilum or scar almost the length of the seed. The red-seeded variety seems to be the commoner one in cultivation here, although the white-seeded one is of slightly better quality. A variety with white flowers has also been described, but all those noticed in cultivation here, both red- and white-seeded, have had lilac flowers.

The Sword Bean is found under cultivation through much of Asia and Africa. It has been introduced into America and Australia, but is only grown in these countries to a limited degree. In Queensland, it has sometimes been cultivated and sold under the name of Bengal Butter Bean. The young pods, when 6-9 inches long, before the seeds are formed, are prepared after the manner of French Beans, and are well flavoured and wholesome. They lack the fine flavour of French Beans, but make quite a good substitute. The plant is immune to the bean fly. It is not thought that the seeds of this variety are edible. They have been reported as poisonous in Java, and it would be unwise to take a risk with them. The plant has sometimes been recorded as a forage plant, but experience in Queensland is that it is not very suitable in this respect. As a cover crop, it has proved satisfactory in Porto Rico, and cattle are said to graze there on it to a limited extent.

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* *Canavalia gladiata.*

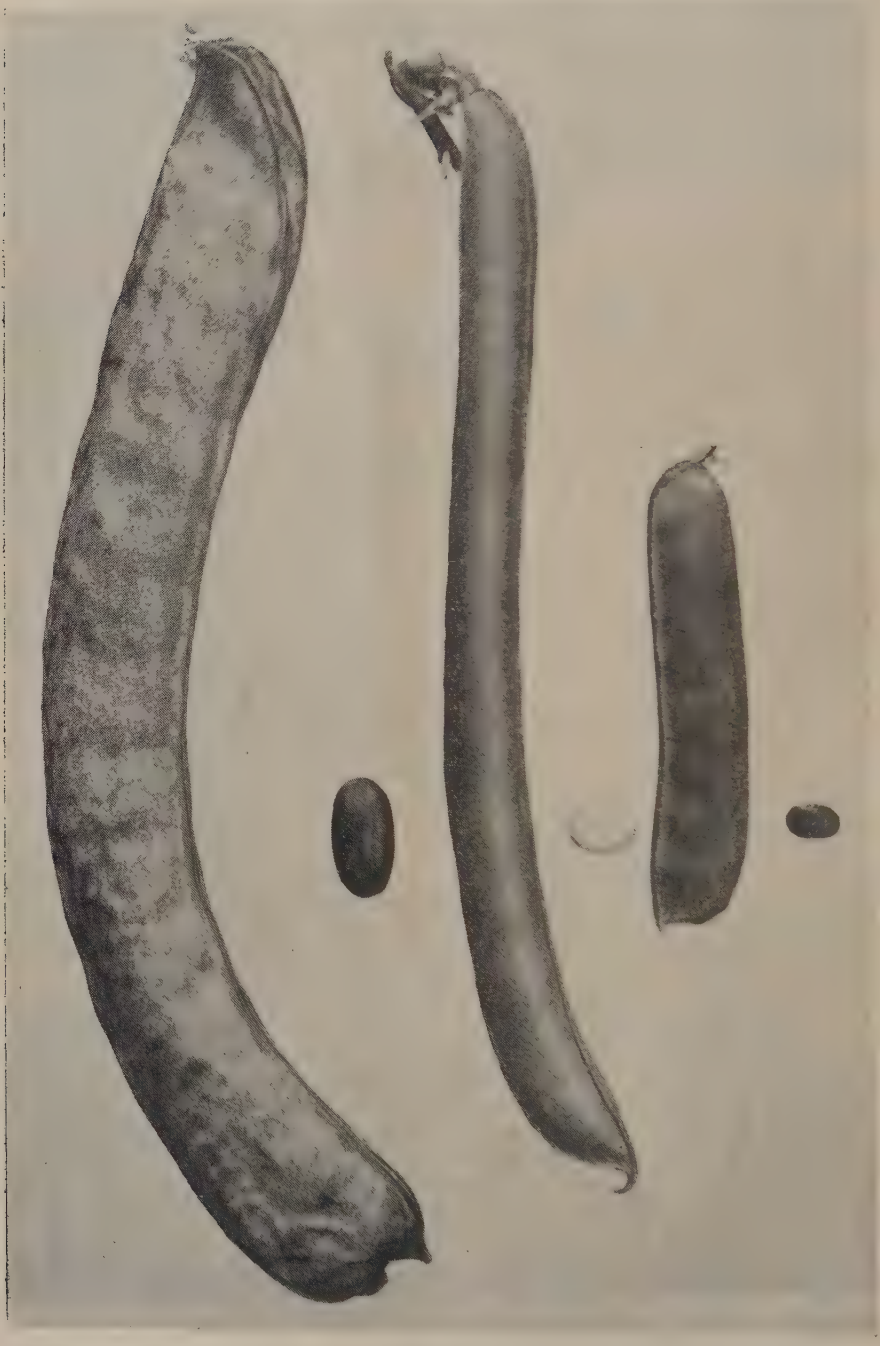

Plate 10.

BEANS AND SEEDS.—Left to right: Sword Bean, Jack Bean, and Native Jack Bean.

The Jack Bean.†

The Jack Bean is a bushy annual plant attaining a height of 4 ft., something after the appearance of a Bush Lima, but it will climb if it has an opportunity. The leaves are composed of three large leaflets and have a bitter taste. The flowers are usually purple. The first blossoms are borne near the base of the stem, so that many of the pods hang low. When mature, the pods are hard and firm and contain 10-14 white seeds, smaller than those of the Sword Bean or Scimitar Bean, and with a hilum not more than half the length of the seed. The plant is a native of the West Indies and adjacent mainland. In Jamaica it is called Horse Bean or Overlook Bean. In Antigua it is known as Babricorn Bean, and has been grown in the southern United States under the name of Pearson and Wonder Bean.

Experience with it in Queensland as a fodder crop has not been satisfactory, cattle disliking the bitter taste of the leaves. Experiments carried out at Hawaii, however, led to the claim that the reason for this was the too limited experience of its use. As with most new feeds, it is important to use only a small proportion in the accustomed ration at the beginning, and then increase the proportion gradually. It is claimed that several dairymen have fed green Jack Beans and sorghum in equal proportions to dairy cows with satisfactory results.

The young pods, about 4-9 inches long, cut into slices and cooked in the same way as French Beans, have been described as excellent in quality. The young pods are tender and palatable, but as they grow older become tough and horny. The nearly ripe seeds may be cooked and eaten in the same way as Lima Beans or Broad Beans.

The Wild Jack Bean.‡

Specimens of the Wild Jack Bean have been received occasionally. It has been recorded as injurious. Reliable reports from New Guinea and the New Hebrides are, however, to the effect that the natives use the young green pods in the same way as the Sword or Scimitar Bean and Jack Bean are used, and the nearly-ripe seeds in the same way as Lima Beans or Broad Beans without any particular preparation, and that both the beans and seeds make a palatable and nutritious vegetable. This is quite common on some coastal and near-coastal scrub areas, particularly as secondary growth. It also is frequently seen along the sea beaches; but in the absence of personal knowledge the departmental advice is to cook and taste discreetly before eating in quantity.

† *Canavalia ensiformis.*
‡ *Canavalia obtusifolia.*

Ellangowan Poison Bush.

W. D. FRANCIS, Botanist.

LIKE all other countries with extensive and varied natural vegetation, Australia has its poisonous plants. A knowledge of the harmful plants of his district often enables the stockowner to avoid sickness and losses in his herd.

The recent losses in the Clermont District of travelling bullocks through eating Ellangowan Poison Bush* brings to notice this widely-spread native shrub. In addition to the common name used here, it is also referred to in some places as Dogwood, Poison Dogwood and Turkey Bush. It belongs to a family† of plants which are widely distributed in the drier parts of Australia. The family contains altogether 138 species, and of these only a few occur outside of Australia. Other poisonous species included in the family are the Native Fuchsia‡, the Boobialla§, and the Spotted Fuchsia‖. A large proportion of the species have conspicuous and decorative flowers.

Description and Distribution.

Ellangowan Poison Bush is a dark-green shrub from 3 to 10 feet high. The branchlets are round, and bear very small tubercles much smaller than a pin's head. The leaves are situated alternately on the branchlets; they measure from 1 to 2½ inches long and ⅛ to ¼ inch wide; they taper at each end, are fairly thick in texture, and are veinless except for the midrib. The flowers are single or in groups of 2-3 in the forks of the leaves, and are borne on stalks up to ½ inch long; these stalks are often curved downwards towards the ground. The flowers are white and bell-shaped, measuring about ¼ inch long. The flowers are followed by the oval, succulent fruit, which are about ¼ inch long.

In Queensland it occurs in the drier parts of the State from the Darling Downs to the South Australian border in the South. In the Central District it approaches the coast at Wood End, near Rockhampton. Clermont is its most northerly record. Jericho and Yalleroi are the most western records on the Central Line. It occurs in all the other mainland States, but is absent from Tasmania.

Symptoms and Lesions.

The effects of the plant on bullocks, as described by Mr. Kearney, Stock Inspector, Clermont, are typical of those observed in another part of the State several years ago. The affected bullocks showed evidence of severe abdominal pain, which was accompanied by trembling. In one bullock, post-mortem examination showed that the alimentary tract from the fourth stomach to the anus was full of red, blood-stained material. The abomasum showed many haemorrhages in the walls. In another bullock the fourth stomach was black, and most of the small intestine was full of black material. The dung in the large intestine was hard and apparently covered with layers of the organ, which seemed to have become detached.

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* Its botanical name is *Myoporum deserti.*

† *Myoporaceae.*

‡ *Eremophila maculata.*

§ *Myoporum acuminatum.*

‖ *Eremophila Latrobei.*

The principal damage by this plant, as with many other poisonous plants, occurs when stock are travelling and hungry. It has frequently been noticed that paddock stock are rarely affected by native poisonous plants, unless the climatic conditions, such as the prevalence of drought, are particularly severe.

Plate 11.

ELLANGOWAN POISON BUSH.—Specimen showing the dried fruits. The curved stalks of the fruits are shown.

"Queensland Spinach."

Dr. E. Hirschfeld, M.D., Bybera, Goondiwindi District, in a letter to the Hon. T. L. Williams, Minister for Agriculture and Stock, writes under date 3rd June, 1943—

There has been this year a good growth of herbage in the West. Outstanding from amongst this herbage, because of its profuse growth, is the Creeping Saltbush—long known as a valuable stock feed. Recognising its worth, I made it my business to learn more about this plant: its mode of growth, its habitat, and, more particularly, its rooting system. The data and specimens collected should be the starting point of further investigations, which promise to be of benefit to the pastoral industry.

There is, however, yet another aspect to this plant, which appealed to me more even than the pastoral value of the Creeping Saltbush. A few years ago I made some investigation into native vegetables, of which an account was published in the March, 1939, number of the *Queensland Agricultural Journal.* When I wrote that article, I had not tried out the Creeping Saltbush as to its fitness for human consumption. This time, with the increasing scarcity of vegetables all over Australia and the growing demand for them, I determined to test the value of Creeping Saltbush as a vegetable for human consumption.

There was no difficulty in collecting the material, as the plants were growing practically everywhere on the run. The small, light green leaves were stripped from the branches; not being handy at it, I found this part of the business rather tedious. The leaves cannot be boiled in their own juice but require more water to be added. This they take up greedily, swell up with it, and turn a dark-green colour. I had several helpings and relished them, though I must admit the other members of the household were less enthusiastic about it than I was. I ate it at three successive meals; I certainly did not notice any ill effects, neither did anyone else who had eaten it. Butter improved its taste.

Creeping Saltbush tasted somewhat like spinach. It is evidently rich in mineral salts of its own; hence required neither salt nor pepper for further seasoning.

I have named it "Queensland Spinach." This name might make it more acceptable to those who despise the home-grown article.

I submit no chemical analysis. When our known vegetables came first into use hundreds of years ago, they were adopted probably by the same rough and ready method which I employed; our cattle were the guinea pigs of the laboratory.

I have, however, substantial evidence to offer that this Saltbush of ours is a valuable food. As mentioned before, I made a special study of the rooting system, going to a deal of trouble in following up and dissecting the roots. I brought down to Brisbane with me a specimen by no means unique. This plant, apart from a dense network of roots, immediately underneath, sends out in all directions rootstems up to 4 or 5 feet in length. This means that the roots of a single plant are ranging over an enormous area, where they can scout in search of food and minerals and deliver them to the leaves. We know, moreover, that vitamins are generally associated with minerals.

This extensive rooting system of the Creeping Saltbush makes it a nuisance to the farmer in cultivated areas.

The facts I have submitted warrant further tests to be made without delay. They must probe into the value of this "Queensland Spinach." The demand for more vegetables is loud and pressing. Here is a native vegetable, growing in great abundance, and at present running to waste.

In his reply to Dr. Hirschfeld, Mr. Williams quoted the following memorandum on the subject by the Government Botanist, Mr. C. T. White:—

"I have read Dr. Hirschfeld's letter with interest. His choice of the name "Queensland Spinach" for the Creeping Saltbush (*Atriplex semibaccata*) is rather appropriate, because the plant is very closely allied to the European Spinach (*Spinacea oleracea*). This belongs to the same family and actually in the same section of it as the Queensland Saltbushes. Silver Beet, a variety of *Beta vulgaris*, also belongs to the same family (*Chenopodiaceae*) but further removed in natural classification. I would not say that the Creeping Saltbush is the best of the Saltbushes for human consumption as a vegetable, but it has the virtue that it is exceedingly common, especially on the black soil plains of the inland parts and is also common on reclaimed Brigalow-Belah country.

"Probably the best of the Saltbushes as a vegetable is the Blue Bush (*Chenopodium auricomum*), which is used fairly extensively by people in the West (especially in the South-West about Charleville, Cunnamulla, Eulo, and other places). This species is very abundant on flooded country particularly. Another one, but which I have not tried, is the Western Fat Hen (*Chenopodium auricomoides*). The use of the Old Man Saltbush (*Atriplex nummularia*) has been spoken of before by Dr. Hirschfeld and other writers. The leaves of this can be cooked or eaten fresh. When cooked, as with most others of the Saltbush Family, they should be cooked in plenty of water and without salt.

"It might interest Dr. Hirschfeld to know that at the present time we are sending to the Government Analyst, at his request, samples of native vegetables for testing for vitamin C content.

"Unfortunately, we are able to supply very few at the present time from the vicinity of Brisbane, and a feature of vitamin determination is that the plants must be fresh.

"The establishment of a plot of these native vegetables has been suggested so they could be tried in a practical way for their culinary qualities. Such a plot would yield at the same time fresh specimens tested for vitamin content."

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Address all renewals and other correspondence to the Under Secretary, Department of Agriculture and Stock, Brisbane.

PLANT PROTECTION

Potato Seed Treatment.

R. B. MORWOOD, Research Officer.

TWO methods are available for seed treatment; one, using formalin and the other, corrosive sublimate. The seed potatoes should be first washed if they have much dirt adhering. Treatment should be carried out either before the tubers commence to sprout or just prior to planting. In the latter case, they are treated before cutting. If sprouted seed tubers are dipped, some injury to the sprouts is liable to occur unless they are planted in moist soil by the next day.

Potato seed treatment, of course, cannot be expected to be productive of any real improvement in the disease situation if the soil, in which the crop is to be grown, is heavily infected with the fungi responsible for the diseases against which the treatment is adopted. It can, however, prevent uninfected soil becoming infected, and it should be of value in cases where the soil is only lightly infected. Land which has produced a crop in which tuber-borne diseases, such as common scab and black scurf or Rhizoctonia scab*, have caused severe losses should be rotated to other crops, such as lucerne, for several years, and when it is replanted to potatoes seed treatment should be adopted.

Hot Formalin.

The formalin solution is made up by adding one pint of commercial (40 per cent.) formalin to 15 gallons of water. The mixture must be then heated to 125 deg. F. and kept at this temperature during the treatment. The seed tubers are dipped into the solution for two and a-half minutes in small amounts in crates or loose gunny sacks, then taken out and the solution allowed to drain back into the treating tank, another lot of potatoes being then dipped. The treated tubers are covered with bags or canvas for one hour to keep the formalin fumes in. They are then spread out to dry before planting.

The even temperature can be maintained with steam heat where this is available. Otherwise a small fire may be built under the tank and carefully regulated, or some of the solution may be kept hot in a convenient boiler and added to the main tank as the solution cools. In any case, the temperature must be constantly measured with a good thermometer, such as a dairy thermometer, and no more than a 5 deg. variation is allowed.

* These and other potato diseases are discussed in some detail in "*Potato-growing in Queensland,*" published by the Department of Agriculture and Stock in 1942.

Acid Corrosive Sublimate.

The corrosive sublimate method has the advantage that it can be used cold, but the materials are somewhat more expensive. The solution is made up by dissolving ¼ lb. of corrosive sublimate and 1¼ lb. of hydrochloric acid (spirits of salts) in 12½ gallons of water. A wooden tub must be used as this mixture corrodes metal vessels. The tubers are soaked for five minutes, then spread out to dry. The solution can be used repeatedly but loses its strength gradually, so fresh solution should be made up after ten lots have been treated. Corrosive sublimate is a deadly poison, so great care should be taken when it is used. All treated tubers must be planted to avoid all possibility of their being consumed by any person or domestic animal.

Organic Mercury Compounds.

There are several proprietary potato dips with an organic mercury base for which it is claimed that the method of application is simpler than with formalin or corrosive sublimate. When using them the manufacturer's directions should be followed.

Citrus Gall Wasp.

W. A. SMITH, Assistant to Research Officer.

THE occurrence of swollen twigs (Plate 12) on citrus trees is a fairly common sight in the coastal areas south of Cooroy, more particularly in neglected orchards. These malformations are caused by the

Plate 12.
GALLS ON CITRUS TWIG.

citrus gall wasp, a small black insect roughly the size of the common house ant. In spring the female wasp lays its eggs in the tissues of the young woody growth, and a few weeks later these eggs hatch and give rise to small, white-coloured larvæ. During the summer months these larvæ feed on the inner tissues of the twig and interfere with the sap flow. The plant reacts by forming a gall around the insect intruders. Inside the gall each larva is enclosed in its own cavity (Plate 13), and the number of these determines the size of the gall. When full-grown, usually in early spring, the larva changes to a pupa, from which the adult wasp soon emerges and eats its way out of the gall. Adult emergence begins in September or early October—the emergence holes being slightly larger than pinholes and quite conspicuous on the surface of the galls. The female lays most of its eggs within a week of emergence.

The citrus gall wasp has been recorded from all varieties of citrus grown in eastern Australia, but lemons are most severely infested. Native species of citrus growing in coastal rain forests are also attacked. Orchards containing trees with a large number of galls are unsightly, and frequently unprofitable.

Because of the relatively sluggish habits of the adult wasp, the spread of the insect from tree to tree in an orchard, and from one orchard to another, is usually rather slow. The females emerging in spring generally select for egg-laying a young twig on the tree from which they themselves have emerged.

Plate 13.
GALL CUT OPEN TO SHOW LARVAL CAVITIES.

Three parasites of the citrus gall wasp are known, but it is sometimes necessary to supplement the work of these beneficial insects by systematically removing the gall-infested twigs during the winter pruning operations. All prunings must, of course, be burned to destroy the larvæ. The efficiency of these regular and careful prunings in controlling the pest may readily be understood when it is realised that the only living forms during winter are in the larval stage inside the galls, and that reinfestation from native citrus or neighbouring orchards is very slow. Care should be taken to remove even the small galls since any that are left will provide a source of reinfestation during the following spring.

Whiptail of Cauliflowers and Cabbages.

F. W. BLACKFORD, Assistant Research Officer.

WHIPTAIL (Plates 14 and 15) is a common disease of cauliflowers and cabbages in Queensland. The midrib and main veins on all or some of the leaves on affected cauliflower and cabbage plants are shortened, this shortening being accompanied by a curling, twisting, and puckering of the blade of the leaves, which are also very much thickened and brittle. In the case of severely affected cauliflowers, only a few outside leaves are formed, and these are very curled and puckered, and are so incompletely developed that the leaf margin is very indented. The inner leaves of such cauliflowers either fail to grow at all or remain very short and stubby; the plant does not die, but it produces no flower. Cabbages are more resistant to the disease than cauliflowers.

Plate 14.

NORMAL CAULIFLOWER LEAF ON LEFT. LEAF FROM WHIPTAIL AFFECTED PLANT ON RIGHT.

Control.

It has been demonstrated that no parasitic organism is concerned in the incidence of this disease. Tests of soil from affected areas have shown it to be acid, but this acidity can be corrected by an application of lime; and the fact has been established that, where lime has been applied to a soil which has previously grown cauliflower or cabbage crops affected with whiptail, subsequent plantings have developed normally. Growers who have, or have had, cauliflower or cabbage crops affected with this disease, and who intend liming their soil, should communicate with the Department of Agriculture and Stock, as the rate of liming varies with the type and degree of acidity of the soil. A composite sample of the surface soil to approximately 10 inches in depth should be taken from several spots in the affected field and sent in for testing. Some idea can then be gained

of the amount of lime which is necessary to correct the acidity so conducive to the development of whiptail.

Plate 15.
WHIPTAIL AFFECTED CAULIFLOWER PLANT ON LEFT. NORMAL PLANT ON RIGHT.

The method of sampling the soil is to dig a small hole about 10 inches deep and clean a face on the side of the hole. A slice of soil 3 inches thick is then removed with a spade and placed on a clean bag. This operation is repeated several times over the field, and the whole of the slices are then well mixed together, and a quantity approximately ½ lb. in weight is taken and forwarded for testing.

A QUEENSLAND AGRICULTURAL SCIENCE QUARTERLY.

Hitherto, the only medium available in Queensland for the publication of scientific and technical papers contributed by the Research Divisions of the Department of Agriculture and Stock has been *The Queensland Agricultural Journal*. This association of the science and practice of agriculture and animal husbandry in the one publication has obvious disadvantages, particularly to primary producers who are more immediately interested in crops and stock. With the exclusion of research papers from the *Journal*, the necessity for a separate publication has arisen. It is felt that this new system of presentation will be advantageous to readers, whether they are in search of information on farming practice or the scientific facts on which such practice is based.

It is anticipated that the first number of the new Quarterly will be issued in September.

Citrus Branch Borer.

A. R. BRIMBLECOMBE, Assistant Research Officer.

BRANCHES of citrus trees are attacked by several species of borers, but a fairly large one, commonly known as the citrus branch borer, is perhaps the most important of these. Dead or dying branches are typical signs of damage by this insect.

The life cycle of the citrus branch borer includes the usual four stages, namely the egg, larva, pupa, and adult. The egg is elongate-oval in shape, one-tenth of an inch in length, and yellowish in colour. From it there emerges a small, pale-yellow grub, which gradually increases to a length of about 2½ inches when full-grown. (Plate 16.) It is more or less cylindrical in shape, and the first three segments of the body are slightly larger than the others. The actual head is small, but is provided with a pair of stout jaws. Each of the first three segments bears a pair of short peg-like legs, and the remaining body segments have, on both the upper and lower surfaces, enlarged corrugated areas which grip the wall of the tunnel excavated by the grub in the infested branch and assist movements along the tunnel. The pupa is yellowish in colour and measures about 2 inches in length; all the appendages of the adult are discernible in this stage. The adult (Plate 16) is an elongate beetle about 1½ inches long and less than ¼ inch wide. The conspicuous antennæ are as long as the body. The insect is greyish brown in colour and has a sheen imparted by the fine silky hairs arranged in faintly discernible longitudinal ridges on the upper surface of the body.

Adults usually lay their eggs on twigs and small branches, probably in cracks in the bark where mechanical injury has occurred. The eggs hatch in about 10 days, and the young grubs immediately bore into the wood. They seem to prefer the centre of the branch, and make a clean-cut, cylindrical tunnel, often of considerable length. (Plate 16.) They work downwards, that is, towards the trunk. Periodically the grubs construct a dome-shaped cavity from the longitudinal tunnel, and this ends in a small opening on the surface of the branch. This seems to be used for the disposal of waste material from the main tunnel. If the branch is large, the grubs may leave the centre and work spirally down the branch just under the bark; such tunnels are commonly made by the older grubs, and may partially or completely encircle the branch. The damage is then akin to ringbarking, and usually kills the upper portion of the branch, which frequently breaks under its own weight or when a strong breeze is blowing. When its full size has been attained the grub hollows out a large chamber, 3 to 4 inches long, often in a thick part of the branch. The tunnel, both above and below this chamber, is plugged with pieces of wood torn away while it is being enlarged. Pupation occurs in the excavated chamber. It may take place as early as September, and the adults are then ready to emerge in October and November. However, development is not uniform and, while some larvæ may reach the adult stage in October, other adults emerge during summer. Mating usually occurs soon after adult emergence, and egg-laying commences shortly afterwards. Because of the long period during which adults are emerging, egg-laying is in progress throughout most of the summer months. However, there is apparently only one generation each year.

Though the citrus branch borer is a native of this country, its scrub host being the finger lime, attacks may occur on most varieties of citrus. The initial infestation in an orchard may begin on only a few trees, but if control measures are neglected, the pest may become serious within two or three years. It is doubtful whether the insects will attack sound branches; certainly cracks in the bark or pruning injuries seem to attract them. Trees lacking vigour are particularly prone to attack, and old trees are therefore apt to suffer considerable damage.

Control.

The aim of the orchardist should be to eliminate conditions favouring an attack. This is best done by efficient cultivation, manuring and pruning which are all essential for the maintenance of healthy, vigorous trees. The trees should be kept as free as possible from bark injuries, and if it is necessary to climb on them sandshoes should be worn. Pruning cuts on the larger branches should be sealed with a grafting wax or crude petroleum jelly. The trees should also be regularly examined for borer injuries; otherwise injury might not be detected until branches are dying. However, the waste material ejected from tunnels through vent holes can often be seen in time to save the branch. The grub can then be killed by inserting a piece of pliable wire into a vent hole and working it down the branch. A better method is to first plug all the vent holes, except one on the upper side of the branch, with soap or other plastic material; a little car-

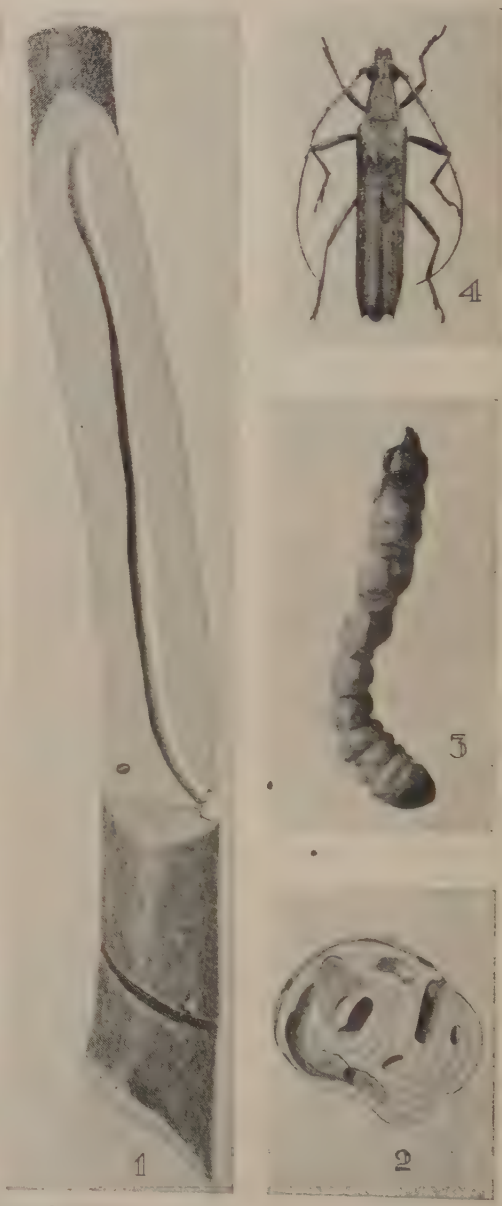


Plate 16.

CITRUS BRANCH BORER.

Fig. 1.—Branch showing larval tunnelling. Fig. 2.—Cross-section of damaged branch. Fig. 3.—Full-grown branch borer larva, natural size. Fig. 4.—Branch borer adult, natural size.

bon bisulphide is dropped into the open hole, which is then also sealed. The fumes evolved from the fumigant travel along the tunnel and kill the grub. If the branch is obviously dead or dying, it should be cut off as soon as its serious condition is noticed and the grub destroyed. The cut must be made in healthy bark tissue, but need not be below the limit of the grub's activity, provided the insect remaining in the branch is destroyed either by pliable wire or by fumigation; the cut should be sealed as in the case of pruning cuts. Dead wood, of course, should be completely removed and burned.

Though other borers attack both citrus and other cultivated trees, the control measures to be adopted are, in most cases, very similar to those just described, and can be applied with such slight modifications as the habits of the tree and the associated insect suggest.

INSECT ENEMIES OF NUT GRASS.

Certain insect associates of nut grass in Queensland were investigated some years ago, these including two small insects in the scale insect family. The more important of these, the nut grass coccid was at one time regarded as a possible nut grass eradicator, or was at least considered to be seriously detrimental to the plant, feeding as it does on the nuts and roots. The other insect is somewhat closely related to the nut grass coccid. As a result of the investigation it was found that except under dry soil conditions both insects possess little, if any, value in controlling nut grass, and if the plant be growing in a heavy soil under moist conditions, the insects have no controlling influence whatever. The larva of a weevil is a third insect, which is sometimes found associated with nut grass, in which it feeds inside the nuts. It is occasionally responsible for a local, temporary reduction in infestation in the Bowen district.

J.A.W.

Fat Lamb Raising in Queensland.

J. L. HODGE, Instructor in Sheep and Wool.

IN Queensland, in the course of the last few years the quality of fat lambs has improved considerably. This improvement has been brought about, to a large extent, by the practical interest taken by producers in the fat lamb scheme inaugurated by the Department of Agriculture and Stock. This scheme provides for the purchase of pure-bred rams of the various suitable breeds and their loan to approved fat-lamb raisers. This form of assistance continued for a period of five years. Probably the greatest benefit derived from the scheme has been in its educational value, inasmuch as farmers had demonstrated to them the very great improvement in their lambs through the use of pure-bred sires, no matter what breed was chosen. The importance of pure-bred sires in a fat lamb raising flock cannot be too strongly stressed. The matter of a pound or two in the purchase of suitable rams should be regarded as an economy rather than an expense.

Expansion of the Industry.

Numerically, lambs produced in Queensland do not compare favourably with production in the other States. There is, however, a good opportunity for considerable expansion of the industry in this State, in view of the eventual utilisation for fat lamb production of that very large area of rich brigalow and belah country stretching, with breaks, from Goondiwindi to Theodore. These lands, when improved, are well adapted for the purpose. The whole region, on an average, receives a sufficient rainfall. Clearing and the preparation of the land for cultivation is admittedly costly, but not uneconomic. In very few cases are fat lambs successfully produced on native grasses. It must, then, be admitted that cultivation is a necessity in the industry.

Unlike other parts of Australia, our rich lands respond poorly to superphosphate. This more or less rules out pasture improvement as practised elsewhere. Fodder crops for the feeding of ewes with lambs at foot, especially during the winter months, must, therefore, be regarded as a necessity in fat lamb raising in Queensland. All the cereals are recommended. In the case of wheat, the farmer may be fortunate enough during a prolific season to harvest a crop after feeding his ewes and lambs on the first growth.

The growing of sorghums for sheep has made rapid and important progress on the Darling Downs, and elsewhere in Queensland. With a cropping system of cereals and sorghums arranged at proper intervals

practically a whole year's feeding may be provided if the season is average or better.

The Need For Uniformity.

Regarding the whole State's production as a seasonal drop, more uniformity in the lambs should now be looked for. Experimental periods are passed, and farmers should avail themselves of the knowledge of breeds and crosses gleaned over a long period of years.

Points in Breeding.

Suitable crossbred ewes are hard to come by, and very costly, too, when located. Corriedale ewes are hard to beat, but they, too, are costly. With merinos preponderating to such an extent in the State, it will be presumed that growers must make a start with this breed. The largest and most robust type should be chosen. With these should be joined one of the long wools—Border Leicester, the Romney Marsh, or the Lincoln. All produce excellent ewes for the purpose of breeding fat lambs. Of the resultant drop, the ewe lambs should be saved as the future mothers in the fat lamb flock. The wether lambs should be disposed of as fat lambs. On these crossbred ewes, when mature, should be used one of the Downs type of ram. Both the Southdown and the Dorset Horn have proved themselves excellent for Queensland conditions. The whole drop should be marketed. With correct feeding conditions a crop of lambs bred the right way should be ready for market at 12 weeks or a little later.

It is a good idea when joining Southdowns or Dorsets to introduce also one or two of the long-woolled type of ram, for the purpose of breeding a few ewes of the type required for replacements each year. There was a time when it was customary to say that the wool from a lamb-rearing flock was of quite a secondary consideration. With the enhanced demand for crossbred wools, and the prices such wools are bringing, that saying no longer applies.

Pure Corriedale wool with plenty of character brings an excellent price nowadays, and the same may be said, to a lesser extent, of the crossbred wools derived from crosses recommended in the ewe flock.

Money in Fat Lambs.

From a financial point of view there is no quicker money in the whole of the sheep industry than in the successful production of fat lambs. Over the past five or six years the prices received in Queensland for true sucker lambs have compared more than favourably with Southern returns. Just at present, because of war conditions, there is a ceiling price, but this is generous, and leaves plenty of margin for profitable returns to the grower.

Marketing.

In the marketing of lambs, the greatest care should be exercised. Avoid trucking them when in a heated condition. Remember, a prod with a stick leaves a bruise in so tender an animal, with the probable rejection of the carcase. Do not lift a lamb by the wool; this, too, bruises. Never overcrowd the truck. In fact, take every care so that a consignment may arrive at the yards carrying the bloom so necessary for top prices.

Food and Fat Percentage in Milk.

E. B. RICE, Director of Dairying.

INQUIRIES are often received as to the effect of certain foods on the fat content of milk. To simplify discussion, it is proposed to deal with the subject under three headings, viz.:—

(1) The feeding of an adequate and balanced ration—i.e., normal feeding.

(2) Abnormal feeding, resulting in the animals receiving a deficiency, or an excess, of certain nutrients in the diet fed.

(3) The influence of the condition (feeding) of the animal prior to the lactation period.

Normal Feeding.

Numerous investigations in many countries have demonstrated that in herds of cows given an adequate and balanced ration, changes in feeding can at most cause only a slight and temporary change in the fat percentage of the milk yielded, and that a permanent increase in the fat percentage of milk by this means cannot be obtained. Even the excessive feeding of fats and oils to cows will not cause a permanent appreciable increase in the fat percentage in their milk. In fact, cod-liver oil feeding has been found to depress the fat content, the depression continuing for some time after the oil is omitted from the food.

It is to be clearly understood that these notes deal only with the influence of feeding on the actual percentage of butterfat in milk. Undoubtedly, by increasing (up to a level depending on the individuality of each animal) the quantity of nutrients fed—particularly protein-rich concentrates—it is often possible to effect a pronounced increase in the total quantity of milk and, consequently, fat secreted; but the actual percentage of fat in the milk still remains constant, irrespective of whether a cow is fed to produce the maximum quantity of milk of which she is capable, or less than this amount. This is because the fat percentage in the milk of each individual animal is an inherited characteristic, depending chiefly on the breed of the cow and, within any particular breed, on whether the family from which she is descended possesses the capacity of yielding milk above or below the average fat percentage of the breed.

Although by milking cows at unequal intervals of time, there may be a difference in the fat content in the morning's and night's milk, if the mean test for the two milkings in twenty-four hours be taken, it will be found that the tests will not vary to any appreciable extent from day to day in the bulked milk of a herd. Individual cows may, however, sometimes be found which show a tendency towards daily fluctuations in the fat percentage in the milk yielded by them, but in the bulked milk of a herd the daily difference should be inappreciable. There is, of course, a seasonal variation which is normal and which in Queensland averages about 0·3 per cent. between midsummer and mid-winter milk, the latter being of the better quality.

Abnormal Feeding.

Apart from normal feeding methods, investigations have also been made concerning the effects of various kinds, quantities, and qualities of food on the fat percentage of the mixed milk of a herd. Some of these will now be discussed.

(*a*) *Increasing the Plane of Nutrition.*—Suddenly increasing the milk yield by changing to a better balanced and/or more adequate ration may temporarily decrease the butterfat percentage. Continuous over-feeding will improve the condition and maintain yields, but does not cause a permanent increase in fat percentage. A change from over-feeding to feeding a normal balanced diet may decrease the yield and temporarily increase the fat percentage.

(*b*) *Lowering the Plane of Nutrition.*—A sudden change to a ration which decreases the milk yield sometimes temporarily increases the fat percentage. A deficiency of any constituent needed in the food supply of a cow does not usually cause an immediate falling off in milk yield or appreciable change in fat percentage, for the cow will continue to maintain the yield by drawing on her body reserves for the constituent lacking in the diet. Only when the body reserves have been depleted to such an extent that health is endangered will the milk flow be reduced. Prolonged underfeeding is, however, likely to result in a diminution in fat test and, of course, a greatly lowered yield.

(*c*) *Inclusion of Oils and Fats in the Ration.*—Claims to have effected temporary increases in fat percentage by feeding oils and fats have sometimes been reported. Possibly such increases were due, not to the oils and fats themselves, but to abnormal feeding. Some cows may be quite unaffected by these feeds. In any case, as any increase in fat percentage would not justify the cost of such feeding practices, they must be condemned as wasteful. It has been previously mentioned that some fats actually depress the fat percentage; experimental feeding of codliver oil at the rate of 6 oz. per cow per day definitely reduced the fat content. Similar results with herring oil were obtained in some American feeding investigations. On the other hand, there is experimental evidence from Victoria of the effect of meat-meal, fed at the rate of 1½ lb. per cow, causing an increase in the butterfat content of milk for a period of three months; possibly because of the correction of a protein deficiency.

Condition of Cow Before Commencing Lactation Period.

The condition of the cow before calving materially influences the fat percentage and the yield of milk in the ensuing lactation period. A cow, if fed well in the months prior to the oncoming lactation and

fit at calving time, will maintain its milk yield better throughout the lactation than if she calves in poor condition; and, furthermore, a higher test will be maintained. It is desirable particularly for the cow to be dried off and adequately fed in the six to eight weeks before calving, in order to prepare for the heavy demand on its constitution in the approaching milking period. The noted English authority, Dr. John Hammond, in a report on a comparatively recent visit to Australia, said in this connection: "If cows are going back in condition in the last six weeks or so before calving, the whole lactation (especially for first and second calvers which are making body growth also) will be lowered; extra food given at that time will have more effect on the total output of butterfat in the lactation than it will during any part of the lactation period itself. The feeding of calcium phosphate during this period, to obtain a body storage for the subsequent lactation, is also frequently neglected." Thus, if a cow calves in poor condition through underfeeding (and particularly in the last six weeks or so of pregnancy), even if well fed after she again freshens, she will be incapable of yielding to her fullest capacity during that lactation period. This is a matter worthy of consideration on many Queensland farms where the dry stock are kept in "dry paddocks" (usually with inferior pasture) until the calving date is nearly due.

HOW TO PRODUCE CHOICE CREAM.

E. B. RICE, Director of Dairying.

Dairy buildings and equipment of a reasonable standard are conducive to efficiency in the routine of a dairy farm, but much can be achieved even with limited facilities, provided every care is taken which skill and experience suggest. There are, however, two primary requirements for the production of cream of high quality—

(1) An abundance of water.

(2) Adequate facilities for boiling water; a 12-gallon copper (or its equivalent) provides the minimum requirement.

On many farms on which low quality cream is consistently produced these essentials are often lacking. They should be given priority over all other considerations by any producer whose limited financial resources may only gradually enable him to bring his premises into conformity with the Dairy Regulations.

The rules of dairy hygiene set out below have been prepared with the object of assisting in the production of choice quality cream. By studying the rules, and then by strictly amending any practices found to be at fault, any supplier of low-grade cream should be able to improve the quality of his cream immediately.

Rules of Dairy Hygiene.

1. All milking cows should be sound and healthy.

2. Freshly-calved cows' milk should not be separated until 10 days after calving.

3. Before milking begins, rinse with clean water all cream cans and utensils (including milking machine, if used). A weak chlorine solution is recommended for the rinsing.

4. Wash udders and teats with a cloth moistened in water in which there are a few crystals of Condy's fluid; or use a weak chlorine solution. Keep enough cloths to enable each to be replaced as it becomes soiled.

5. Test the foremilk of each teat to observe if the milk is normal. Keep a separate small vessel for the foremilk, which, if sound, may be subsequently fed to pigs, or rejected. A piece of black cloth fixed over the strip cup helps in detecting clots, presumptive evidence of other trouble.

6. After milking, wash, scald, and hang udder cloths to dry in a dust-free place.

7. Wash the hands before and as often as necessary during milking. Provide soap, water and towels for this purpose. If possible, practice dry milking. Do not "lubricate" the hands with milk. The personal factor often is the weak link in clean milk production.

8. The sterility of utensils is the most important single factor in dairy hygiene. Thoroughly clean and near-sterilize all utensils after use in the following way:—

(*a*) Immediately after milking, first rinse utensils with plenty of cold water to remove all remnants of milk and cream.

(*b*) Then wash utensils thoroughly (both inside and outside where necessary) with fairly hot water in which washing soda or other cleanser has been dissolved. This makes the utensils physically clean.

(*c*) Then steam the utensils or immerse them in boiling water. "Scalding," which is the usual final step on most farms, is only efficient if plenty of boiling water is used. The utensils should then be near-sterile.

(*Note.*—For a milking machine, steam is necessary for effective final sterilization. Likewise, in cleaning, at least one gallon of water per unit is required for the preliminary cold water rinse and the hot cleansing solution.)

(*d*) Allow utensils to drain and dry in an inverted position on a metal draining rack situated in a dust-free atmosphere; if desired, the rack may be in a sunny position. Do not use a cloth to dry dairy utensils.

9. Use good quality brushes and not wash-up cloths for dairy cleansing. Wash and sterilize the brushes daily after use.

10. Regularly dismantle and thoroughly clean and sterilize the milking machine.

11. Flush out and effectively steam at least twice weekly the airline of the milking machine.

12. Immediately after separation, cool cream to as low a temperature as practicable and make every effort to keep it cool until despatched to factory.

13. The proper blending of cream from different milkings is important. Do not mix warm with cold cream until the animal heat has been removed.

14. Unless held at a low temperature in a mechanical cooler, stir cream with a metal stirrer from time to time while it is held on the farm.

15. Thoroughly cleanse all cream cans returned from the factory before again using them for cream.

16. Adjust cream screw on the separator to give cream of a 40 to 44 test in summer, and at least a 36 test in winter.

17. Send cream to factory as often as practicable. The summer objective should be daily delivery.

18. Maintain cream cans, all other utensils and equipment, especially milking machine rubberware, in good repair and, when necessary, promptly make renewals or have the cans re-tinned.

19. Sweep and wash down bail floors daily.

20. Remove manure from cowyard daily and endeavour to abate the dust nuisance.

21. Keep the milking shed and dairy tidy. As required, repaint and limewash buildings. Use the dairy house exclusively for dairy produce and not as a general storeroom.

22. Protect dairy produce at all times against contamination from flies, dust, odiferous substances and exposure to direct sunlight.

23. Kindness in "breaking in" a heifer repays itself by the behaviour of the animal throughout its milking life. Do not tolerate noise or rough handling of animals in the milking shed. Nervous or fractious cows are detrimental to cleanly shed practices.

24. Do not "set" dogs on dairy stock.

25. Feed cows on milk-tainting fodders, such as lucerne, immediately after milking and remove the milking herd to pastures at least three hours before the next milking period.

LIMEWASHES FOR DAIRY BUILDINGS.

Limewashes recommended as suitable for milking-sheds, bails, stables, and all outside work, and as a cooling compound for roofs:—

1. 20 lb. lime (unslaked), 30 lb. common salt, ½ lb. alum.

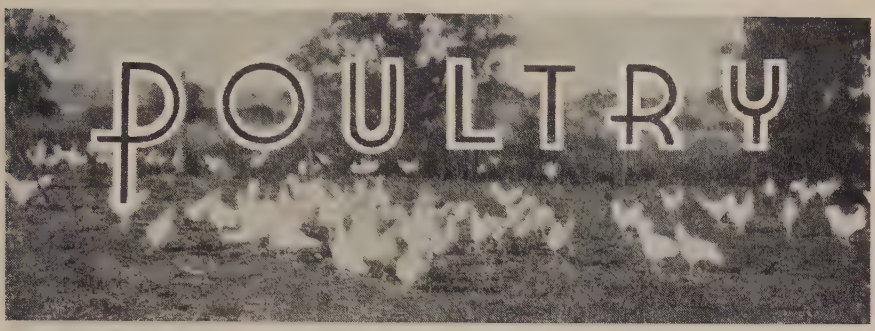
Slake the lime with boiling water until the consistency of the wash is similar to thin cream. As an antiseptic, add ½ pint of crude carbolic to each bucketful of wash.

2. To half a bucket of lime add two handfuls of common salt and two handfuls of tallow. To make two bucketfuls of wash, slake slowly with cold water, stirring continuously. The germicidal value of the wash may be increased by adding ¼ lb. of chloride of lime to every 30 gallons of wash.

3. Slake lime with water and add enough skim milk to bring it to the thickness of thin cream. To each gallon add 1 oz. of salt and 2 oz. of brown sugar or molasses dissolved in water.

Before applying a wash to wooden, metal, or stone structures surfaces should be thoroughly cleaned.

For inside work in dairies and factories, instead of limewashes, reliable sanitary paints are recommended.



Rearing Chickens.

P. RUMBALL, Poultry Expert.

THE hen herself shows what is necessary in brooding. She regulates the heat requirements of her chickens according to their age and the weather. When her clutch is very young she does not move about much, sits often, and extends her range gradually as the chickens grow. On a cold, wet day, she collects her brood frequently and warms them. In brooding, similar principles apply, but with this difference: the chickens have to be trained to do for themselves.

Two systems of brooding are common in Queensland—cold brooding and heated brooding. With both systems many types of brooders are used.

Cold Brooding.

The term "cold brooding" is a misnomer. Artificial heat is not supplied, but the heat of the body of the chicken is retained by means of cloths or flannel and a restricted circulation of air. This system of brooding has been practised for many years, but it is only in recent years that it has been used to any great extent by commercial poultry farmers. The cold brooder may be operated in brooder houses or rearing pens with an equal degree of success. Although the writer has operated the cold brooder with apparently equal results to the heated brooder, the latter is favoured. It can well be understood that the placing of chickens which have travelled a day or so under a cold brooder warmed up with their own bodily heat, will not give as good results as a heated brooder. Also, in cold, bleak weather the heated brooder offers obviously greater advantages.

Heated Brooding.

There are many types of heated brooders, including the box, the colony, and the battery brooders. The firstmentioned type is not used to any extent in Queensland, because of, perhaps, the cost of installation of a suitable type, or because of the general satisfactory results obtainable from the colony system.

Colony Brooder.

Where large numbers of chickens are to be reared the colony brooder is the most economic. With this type of brooder, hundreds of chickens can be run together with little more trouble and attention than would be required for a lot fewer under any other brooding

system. This system also permits of much freer movement of chickens once they have become sensitive as to the source of warmth. Three hundred chickens should, however, be the limit in any one colony brooder. It is also usually a sound rule to depreciate the capacity claimed for brooders by most manufacturers.

The colony brooder consists of a heater with a metal hover for the purpose of deflecting the heat. The fuel used may be coke, sawdust, kerosene, or electricity. It is possible to operate them in open-fronted houses by cutting off ground draughts, but if that is done more fuel will be necessary.

A suitably-sized building to house a 500 colony brooder would measure approximately 14 feet by 16 feet, and at least 6 feet high. The roof may be either a hiproof or skillion. The building should be lined and ceiled and provided with ample light. It should be built to face north-east or north and so that sunlight may be freely admitted. Lighting through glass may be desirable in bad weather, but direct sunlight is much better.

Temperatures.

In heated brooders, temperature is a very important factor. If not warm enough, the chickens crowd together, and correct heating is the only way to prevent this. Overheating should also be avoided because of its weakening effect and difficulty in weaning from the brooders. The general comfort of the chickens is a sure index that the temperature is fairly satisfactory, and if the droppings are well distributed under and around the hover in the morning, it is proof that the chickens have been fairly comfortable. When the chickens are first put into the brooder they come from a nursery in the incubator which generally has a temperature of at least 90 deg., and it as well to start brooders at this temperature and reduce the heat gradually until it is no longer required—say, in from four to six weeks.

The importance of heat in brooding chickens has been demonstrated by investigators at the Michigan State College (U.S.A.). Working with chickens from disease-free stock with a range of temperature from 72 to 96 deg. during the first week of brooding, mortality decreased from 37 per cent. to 5 per cent., and with diseased stock from 57 per cent. to 32 per cent. These experiments were conducted over a period of two years and amply illustrate the importance of temperature.

Ventilation.

With some types of brooders, many chickens are lost because of lack of ventilation and overcrowding. Brooders which are usually made to hold 100 day-old chickens are generally too small for the same number of chickens a week old. It frequently happens also that no allowance is made for additional ventilation with the growth of the chickens. The lack of ventilation has a great weakening effect on both very young and older chickens, causing the very young ones to crowd, and rendering the older birds more susceptible to disease. When chickens have crowded, they present a wet appearance in the morning, to which the term "sweating" is applied. Sweating is not the cause. The wetness is caused by the condensation of the chickens' breath, which would not have happened if proper ventilation had been provided. Chickens which have been overcrowded rarely recover from the ill-effects, so overcrowding should be strictly avoided.

In brooding under any system the following are essential points:—

(1) Limited range, increasing with age.

(2) Sufficient heat, which should be reduced as soon as possible.

(3) Ventilation, which should increase with age.

(4) Correct accommodation. What may be just enough room for 100 day-old chickens rapidly becomes too little as they grow.

(5) Never attempt to brood chickens of mixed ages.

Placing Chickens in Brooders.

When chickens are placed in brooders, the floors should have a light dressing of sand or soil to absorb any excreta and give the chickens comfortable footing. A small amount of litter in the form of soft straw or chips will provide exercise and prevent vice. With both hot and cold brooders, their liberty should be restrained for a start. This can be done by erecting a barrier of wire netting around the brooder, increasing the area day by day. At the end of about one week they may be given the liberty of the brooder house. With the cold brooder, the netting should only allow a range of two or three inches for the first day. With the colony brooder, the range will depend on the heat given off by the brooder. Chickens should be taught to know where the heat comes from, and taught to become "conscious" of the source of heat, and when this is done they should be encouraged to take as much exercise as possible by ranging over the entire brooder house.

Most breeders have outside runs to their brooder houses, and the chickens are allowed out when they are about a week old. Outside runs are not essential if the brooder house is so constructed as to permit of abundance of light and sunshine. However, when runs are provided the chickens should be driven back to the brooder after they have been out for an hour or so on the first occasion. They may be allowed out again in the course of an hour or so. This should be repeated in order that the chickens will learn to return to the brooder house and avoid to a large extent the possibility of their being caught out in a rainstorm or staying out too long and becoming chilled.

Cleanliness in every operation is essential; unsanitary conditions not only pollute the atmosphere of the brooders but are frequently the cause of the rapid spread of serious diseases in baby chickens.

ANIMAL HEALTH

Worms in Calves.

G. R. BRETTINGHAM-MOORE, Veterinary Officer.

MATURE cattle are, as a rule, little affected by parasites which take a heavy toll of calves. Much can be done to lessen both the incidence and effect of worm parasites. Special stress is laid, therefore, on attention to the following preventive measures:—

Preventive measures are designed to reduce the chances of the animals becoming infested. They are based on the knowledge of the life histories of the worms, and of the conditions in a pasture which favour the development and survival of worm eggs and larvæ. As calves and yearlings are most susceptible to infestation, they should be given first consideration when putting the undermentioned principles into operation:

1. Avoid damp, low-lying pastures. Moisture is essential for the development of worm larvæ, and also assists greatly in their survival. Such pastures, if it is impracticable to dry them out, should be used only for grown cattle.

2. Drinking water should be supplied in troughs. Shallow stagnant pools are a dangerous source of infestation, particularly when the pastures are dry, for at such times the animals concentrate on the green feed around them, thus heavily contaminating the ground.

3. Stock as lightly as possible. Overstocking is one of the most common factors predisposing to outbreaks. It stands to reason that the more animals there are in a pasture, the more contaminated the pasture becomes and the greater the chances of the animals becoming infested.

4. Avoid permanent pastures for young stock. Calves and yearlings should, if possible, be run on pastures to which cattle have not had access for at least three months. Such pastures while being spelled from cattle may be grazed by horses, for the worms that occur in horses do not infest cattle, and *vice versa*. If spelling is not possible, pastures for young stock may be cleansed of much of their infestation by firing. Firing of pastures, however, should not be given preference to spelling.

5. The state of nutrition of an animal greatly influences the degree to which it can withstand the effects of an infestation. A poorly-nourished beast is much more susceptible than one in

good condition. Young animals on being weaned should, then, be reared on an adequate and well-balanced ration. During dry periods, all young stock should receive supplementary foods, which may be supplied either by improved pastures, cultivation, or by hand feeding. A good lick will do much to keep the animals healthy. A useful lick may be made up as follows:—

Sterilized bone meal	70 parts
Coarse salt	25 parts
Limonite	5 parts

6. Dairy farmers should keep the calf pens and yards clean and in a sanitary condition.

Symptoms.

The following general symptoms are common to most types of worm infestation:—Unthriftiness, loss of condition, diarrhœa, pale membranes of the eye and mouth and, in advanced cases, "bottling" under the jaws. The diagnosis should be confirmed by killing a badly affected calf and searching for the worms, as described later. A condition of anæmia similar to the foregoing, but without the scouring, may be produced by a heavy infestation of ticks, which should not be overlooked when making a diagnosis.

The large stomach worm or "barber's pole worm" is one of the commonest and most harmful found in calves. It is a blood sucker and inhabits the fourth stomach. Symptoms of infestation are particularly those of anæmia with pale membranes and weakness, although scouring may not be present. There is swelling under the jaws, harsh coat, and rapid loss of condition. The worm measures up to 1¼ inches in length, and is red and white spirally striped.

Examination of the contents of the fourth stomach usually reveals a heavy infestation, or a glass jar may be half filled with ingesta of the fourth stomach, and in a few hours any worms present may be seen crawling up the sides.

It is again necessary to stress the importance of the preventive measures before-mentioned. However, if the calves are affected the following drench should be given:—

Bluestone	1 lb.
Water	2½ gallons.

Dosage.

Calves—

2 to 4 months—1½ to 2 fluid oz.
4 to 8 months—2 to 3 fluid oz.
8 to 12 months—3 to 4 fluid oz.
12 to 18 months—4 to 5 fluid oz.

The dose should be repeated in ten days, and thereafter as often as necessary. Bluestone should only be mixed in enamel, earthenware or wooden vessels because of its corrosive action on metals. Where worms are troublesome in spite of all precautions, it is sound practice to drench all calves in January and April, and again in June or July. By this practice, the infestation picked up in the summer is got rid of before its effects begin to be felt in the winter.

Strangles.

G. R. BRETTINGHAM-MOORE, Veterinary Officer.

STRANGLES is an infectious disease which usually attacks young horses. Natural infection is most common by its characteristic nasal discharge which may contaminate fodder, water, or any materials, such as grooming brushes or clothes, with which it comes in contact.

Predisposing Causes.

Exhaustion, whether due to overwork or bad conditions and crowding together, such as occurs in remount depots, and trucking long distances, all lower the resistance and favour an outbreak.

Symptoms.

Horses are generally off feed for a day or two before anything else is noticed. Then follows a nasal discharge which at first is clear, later becoming yellow and thick, accompanied by a rise in temperature. In a day or two a painful swelling under the jaw can be felt. Breathing is interfered with, and there may be frequent coughing. In uncomplicated cases this swelling comes to a head in a few days and bursts or may be lanced and, as a rule, the animal is well again in a week or so. In other cases (bastard strangles) the abscess may not point and the whole head swells to a very large size. In another type, the infection appears to become generalised. Both these types may end fatally.

Treatment.

Drenching is never permissible because of the inability of the horse to swallow easily. The swelling under the jaw may be induced to come to a head by rubbing in a blister such as—

Red oxide of mercury	1 part
Vaseline	8 parts

The abscesses should not be opened until they have pointed. Once opened they should be syringed out at intervals for a day or two with warm water containing 5 per cent. common salt.

If breathing is very difficult, a mixture containing 1 teaspoonful of potassium chlorate in half a cup of treacle may be smeared on the tongue twice a day, or else an inhalation may be given by pouring boiling water on a teaspoonful of Friar's Balsam in a bucket placed in the bottom of a chaff sack, and then placing the horses muzzle in the open end of the sack.

The horse should be placed in a shady yard with feed and water available. Because of his difficulty in swallowing, the horse's appetite should be tempted with green feed and bran mashes. If there is any tendency to constipation, 6 oz. of epsom salts may be given in the drinking water. Rugging is helpful, except in hot weather. The eyes and nostrils should be swabbed out twice a day with cotton wool and 4 per cent. boric acid.

Prevention.

If there is any reason to suspect strangles, horses should be isolated at the first sign of symptoms. If practicable, their attendant should have nothing to do with other horses. All contaminated food, utensils, and grooming gear should be destroyed or disinfected, either by boiling or treatment with strong disinfectant. If the horse has been stabled, the stable will require thorough disinfection.

Red Worm Disease of Horses.

G. R. MOULE, Veterinary Officer.

EXTENSIVE surveys made recently in many parts of Central-Western Queensland have revealed that red worm disease of horses is very common and may cause serious loss, both from deaths and disability.

Description.

Worms known scientifically as the *strongylus* species are popularly known as "red worms," because of their blood-sucking habits, and, in consequence, their usual redness of colour. There are actually a great number of different varieties of these worms, and they are to be found in the large intestines and the blind gut of the horse. The worms are round in shape, and vary from about ½ to 2 inches in length. The larger worms are often thicker than a wax match, while the smaller ones are as thin as a thread, and are often hard to see.

Life Cycle.

The female worms in the intestine lay their eggs, which are passed out with the manure. The eggs hatch out into very small immature worms, which soon develop a strong protective sheath around themselves which protects them against dry weather. Once this sheath has developed, immature worms have the power to withstand hot dry conditions for almost three months.

The immature worms are picked up by the horse as its graze, and when in the body of the animal some of them commence wandering through the organs. Immature worms have been found in the liver, lungs, kidneys, lymph glands and blood vessels supplying the gut. After their period of wandering, the larval worms (as they are called) return to the large intestines and soon grow into adult worms, which suck the blood of their host.

Damage Done by Red Worms.

The immature worms can do much damage in the course of their wandering through the internal organs of their host, and very often cases have been found, on post mortem, in which the damage done to the lymph glands and the blood vessels supplying the gut is beyond repair. Severe colic, which usually proves fatal, develops when the blood vessels are damaged to such an extent that blood cannot get to the intestines. Some of the larval worms gain entrance to the gut wall, leading to the formation of nodules, which may seriously affect the movements of the intestines.

The adult worms have the power of sucking blood (hence their red colour), and some varieties actually eat the lining off the intestinal wall, leading to the formation of ulcers.

Symptoms.

The symptoms affected animals show are:—

(i.) Animals become easily tired and do not stand up to a good day's work.

(ii.) The coat becomes rough and harsh, despite abundant feed; and the lines running from the butt of the tail down the back of the hind legs become prominent.

(iii.) The horses lose condition, "tuck up" at the flank and begin to assume a haunted look, even though they are not working.

(iv.) In some cases, the membranes of the eyes and mouth become pale; and peculiar soft swellings develop on the legs, the brisket, abdomen, sheath, or head.

(v.) The manure may be soft and bad smelling, and later persistent diarrhœa may develop.

(vi.) Young horses heavily infested do not grow well.

(vii.) Untreated affected horses usually become listless and tend to pine away and die in from six to eighteen months.

Treatment and Prevention.

Taking the long view, treatment is of very little use unless it is combined with preventive measures.

The cause of the very heavy infestation of western horses with these worms is probably to be found in the practice on most properties of keeping a permanent horse paddock. The worm population in such a paddock becomes very high and re-infestation is continually occurring. Horse paddocks should, therefore, be rotated at three-monthly periods if practicable. Most of the immature worms will die out in about three months.

Horses should be treated at the time of each change of paddock—*i.e.*, just before they are drafted into a clean paddock. Probably the most suitable drug to use is phenothiazine, which is now obtainable from most of the chemists in Western Queensland. The dose rate is 1 oz. for the average-sized horse, but this should be cut down to ¾ oz. for smaller animals and may be put up to 1½ oz. for draught horses. The dose of 1½ oz. should, however, never be exceeded. The drug may be combined to advantage with 1 drachm of Istin and can be given as a drench, in gelatine capsules as a ball, or in a bran mash. This drug often makes treated animals a bit "muddy" around the membranes and the urine becomes red, but this should not cause great concern as these effects soon pass off after a short spell.

On a horse-breeding property, it should be a routine practice to treat all brood mares about one month before foaling commences; they should then be moved into a clean paddock in order to give the foals a reasonable chance to escape infestation during their early life.

SCRUB TICK IN CATTLE.

Cases of mortality in fully-grown cattle caused by the scrub tick have occurred in recent years in Queensland. The female scrub tick can be distinguished by its yellow legs from the dog tick, which has brown legs. It is found throughout the coastal belt and in the south as far west as the Bunya Mountains.

The first symptoms are paralysis of the hindquarters. This condition spreads gradually forward until the respiratory centres are involved, resulting in death, which may occur soon after the animal goes down or within about two weeks later. Little has been recorded as to treatment, but in one case success was reported with affected sheep after injection of trypan blue (piro blue). For cattle, 2 oz. of a 2 per cent. solution should be given as a subcutaneous (under the skin) injection, observing the usual precautions as to sterilizing syringe and needle.

The Department of Agriculture and Stock would be interested to hear of any results, good or bad, obtained by this method.

—G.R.B.-M.

AGRICULTURAL :: CHEMISTRY ::

Grain Sorghums for Stock.

MONTGOMERY WHITE, Agricultural Chemist.

GRAIN sorghums are proving superior yielders to maize in regions of less certain rainfall, or where, for various reasons, the water table has become so altered as to render maize a risky crop.

The value of these grains as feed and the methods for using them are set out in brief, in the hope they may help farmers to avoid some of the troubles that have been recorded by correspondents.

In so far as their general feeding value is concerned the grain sorghums fall between wheat and maize and, consequently, in most feeding programmes they introduce no great difficulty. It is only under special sets of conditions—*e.g.*, restriction of routine crops and concentrates brought about by the war—that the deficiencies of the grain are brought into relief.

Pigs.

The low vitamin value of grain sorghums makes it essential to provide pigs with green feed.

It is a safe rule to grind seed for pigs of all ages. Slips which have had access to whole maize make better use of sorghum seed than those previously accustomed to all slop feeding or milled foods. A sudden change to grain sorghum results in appreciable waste—the grain appears undigested in the faeces.

Where grinding is impossible or impracticable, soaking may be done. Soaking is probably cleaner and less laborious than boiling or steaming to jelly consistency.

Arrange for half-bags of the grain, tied with stout cord, to be suspended from a ridgepole arrangement, in water. An old bath tub is just the thing. By having short chains or S hooks hanging from the ridgepole the soaking is done without swelling of the tie cord, and the sack is easily lifted up higher for draining. Arrange to have one feed soaking and one draining. When the drained lot is taken away, raise the soaking lot and put in a fresh feed to soak. In this way, a routine is developed on a night and morning basis. Drain out any liquid left every few days, otherwise it develops an unpleasant odour.

A point to be remembered is that the protein of sorghum is incomplete, biologically, in that it is lacking some of the protein-building bricks so necessary for growing stock or high-producing, grown-up stock. These missing links should be obtained from other sources. The

best are first-grade protein concentrates—*i.e.*, milk, meatmeal, or bloodmeal. Seedcake preparations—*e.g.*, cottonseed, linseed, or peanut—are also good sources.

Hence the importance of feeding pigs good quality protein should be stressed.

Poultry.

One-third of the poultry ration may be grain sorghum, but in all cases where grain sorghums is used extensively, the birds should also get foods rich in vitamin A. Green feed or choice lucerne is best. It is very advisable to include maize in the ration when sorghum represents more than 20 per cent. of the total food.

All poultry foods should contain some protein of animal origin, but this is particularly important when grain sorghum, either as grain or meal, is used extensively. Milk is most valuable. Meat, liver, and bloodmeals are excellent.

Frequently, birds show a disinclination to take the grain when switched quickly from maize to wheat. The golden rule in all livestock feeding is to make any change gradually. If this is done, no difficulty is experienced.

Soaking of grain sorghums for poultry is not advisable.

Horses.

All sorghum seeds should be crushed when fed to horses. Hard-working horses receiving practically all their concentrates in the form of sorghum meals tend to become constipated, and at least 1 lb. of bran daily should be fed.

Dairy Cattle.

To obtain best results from dairy cattle, grain sorghum should be fed in meal form. In the absence of prepared concentrates rich in protein, it is an unfailing rule that grain sorghum feeding means legume feeding. Comparable results are obtained on the best stands of pasture.

Beef Cattle.

Ground or crushed grain sorghum is equal to corn in preparing beef cattle either for show purposes or for market.

Sheep.

Provided sheep are able to get sufficient "fill" to ensure contented rumination, there is no need to treat grain sorghum in any way. Only the very hard grains need grinding, and that only when the roughage is poor.

Under drought conditions, when animals may not be able to obtain sufficient roughage to ensure "cudding," the grain should be ground.

Rural Topics

Wild Life Preservation.

Queensland has done well, and may yet do better, in the reservation of Crown lands for national parks and sanctuaries for wild animal and bird life. The objects of Crown land reservation are various, and cover public recreation, forestry projects, and the preservation of wild life which has a direct bearing on the economy of the State. Bird life, for instance, is of vast economic value in its relation to the control of vegetable and animal pests.

The growing appreciation of the value of birds to the farmer is a very welcome sign—showing, for one thing, that the teachers in our schools, especially our country schools, are doing a fine job in instilling into the minds of our youngsters that birds, by keeping down insect pests, are among the farmer's best friends.

As to national parks—such as the Lamington Plateau and the Bunya Mountains—everyone is surely in agreement as to the importance of preserving or reserving typical forest and jungle lands, mountain country, and stretches of sea coast which have some peculiar interest because of their scenic beauty, their geological structure, their association with human history, their plant and animal life, and, above all, their suitability for recreation and rest.

As to our wild life—our native birds and animals—any national policy of protection is obviously a very wise one. And national park policy may be reasonably based on three broad principles. The first principle is that the preservation or protection of our wild animals and birds is inseparably linked with problems of soil, water, and forests. The second is that our native wild life must have an environment suited to its needs if it is to survive. And the third is that any use—that is, any economic use such as the taking of fur-bearing animals for their pelts (excepting, of course, rabbits, hares, foxes, or any other introduced animals that have become pests to pastoralists and farmers)—should be limited to the destruction of not more than the annual natural increase, if the breeding stock is to be kept up. Another good thing would be to make sure that those animals and plants which are more than ordinarily successful in the competition for life because of greater hardiness or fecundity than the less robust species, should be kept ruthlessly within bounds. The successful sanctuary, as any honorary ranger will say, is not necessarily a place where *all* plants and animals are protected; for, obviously, indiscriminate protection may soon lead to the survival of the species of plants and animals which need no protection at all, and to the consequent disappearance of the very forms of wild life for which the sanctuary was proclaimed.

As with our land and our soil, so with our useful and harmless wild life, it is necessary to acknowledge and appreciate our trusteeship for future generations of Australians.

Some Protected Birds.

Included among Australian native birds which are protected throughout the year in Queensland are:—

Apostle Bird, Australian Ground Thrush, Babbler (all species), Bar-Shouldered Dove, Bell Bird, Black Cockatoo (all species), Black Swan, Blue Mountain Parrot, Boatswain or Tropic Bird, Brolga or Native Companion, Burdekin Duck, Bustard or Plain Turkey, Cassowary, Cat Bird (all species), Cloncurry Parrot, Coachwhip Bird, Cuckoo (all species), Curlew (all species), Darter or Snake Bird, Doves (all species), Dollar Bird or Roller, Finches, Fly Catcher, Fly Eater, Frogmouth, Goose (all native species), Greenie or Scaly-Breasted Lorikeet, Ground Lark (all species), Ground Parrot, Heron.

Ibis (all species), Kingfisher (all species), Kookaburra or Laughing Jackass, Lark (all species), Lyre Bird (all species), Martin (all species), Miner or Soldier Bird (all species), Mopoke (all species), Torres Strait Pigeon, and all other native Pigeon species (including Wonga and Wompoo), Regent Bird, Rifle Bird, Satin Bird (all species), Swallow (all species), Warbler (all species), Wattle Bird, and Wren (all species).

Some Protected Animals.

Animals for which a close season throughout the year has been proclaimed, include:—

Cuscus or Spotted Opossum, Flying Squirrel, Nail-Tail Wallaby, Native Bear (Koala), Opossum, Opossum Mouse, Platypus, Porcupine (Echidna), Rock Wallaby, Tree Kangaroo, and Wombat.

General Notes

Fertilizer Rationing in Sugar Areas.

All available transport has been utilised in moving supplies of blood-bone and superphosphate to the sugar districts. This will result in areas extending from Mackay southwards receiving their full ration by the end of July.

North of Mackay arrangements for deliveries are not, however, so complete.

It is intended that districts which have received a full ration of blood-bone and superphosphate shall be issued with an additional ration for the period ending 31st January, 1944. This will be done as soon as practicable. The present rations will be continued for all districts in which the full ration has not yet been satisfied. Present stipulations regarding delivery still hold.

All available transport facilities will be used to move fertilizers to every district, but those areas which have received the lowest amount will receive first priority of any facilities offering.

If any other districts receive their full ration before 31st January, 1944, and there is a reasonable chance of moving additional fertilizer forward—providing it does not detract from any other districts' claim—a further ration will be issued in advance.

Difficulty is experienced in transporting to each district enough fertilizer to satisfy all growers' rations, and every endeavour is made to prevent, as far as possible, one district being over-supplied at the expense of another. With this in view, a dead-line date is fixed for placement of orders. This gives an opportunity to arrange supplies, so as to avoid any excess fertilizer being transported to any area.

Priority of delivery should be in sequence of lodgment of orders with each dealer on or before the closing date for receipt of orders.

Any grower who does not take delivery when the fertilizer is made available to him misses his turn, and his name will be placed automatically at the bottom of the list, the fertilizer being delivered to those next in order of priority who can take it.

When the date of delivery is nominated by the grower, dealers shall not hold such supplies in store pending that date to the exclusion of other growers.

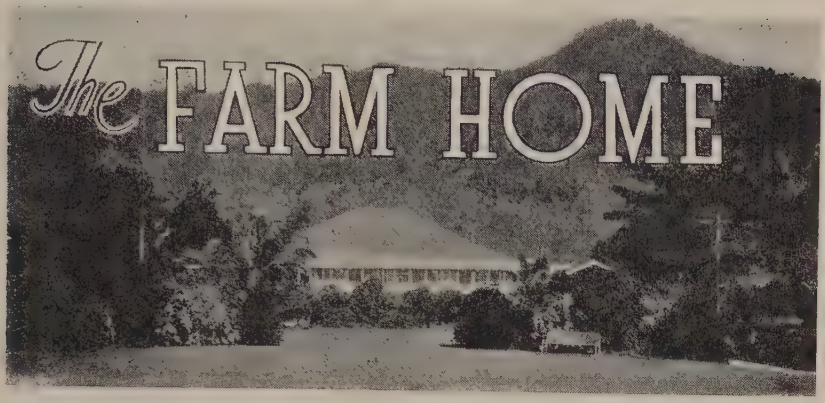
It should be realised that rationing of fertilizer is an endeavour to give each farmer a fair share of the available material, and no one should obtain fertilizer in excess of his ration, otherwise others will have to go short. Unclaimed rations do not belong to any district; they should be equally distributed to all who can use them.

All authorities to purchase fertilizer issued during 1942 under the Agricultural Requirements Control and Conservation Act, should be returned to the Department of Agriculture and Stock without delay, as they have now become ineffective.

Dealer's Purchase Docket—Second-hand Fruit Cases Act.

Regulations under "*The Second-hand Fruit Cases Act of* 1940" have been amended to make provision for the keeping of purchase dockets by dealers in second-hand fruit cases.

The Regulations at present provide for a return of dealers' purchases only, and it is considered that a docket issued at the time of purchase, bearing the signature of both dealer and vendor, and putting the onus on the retailer to receive a purchase docket for cases sold will do much to help in the administration of the Act and the conservation of fruit cases.



Maternal and Child Welfare.

Under this heading is issued each month an article, supplied by the Department of Health and Home Affairs Maternal and Child Welfare Service, dealing with the welfare and care of mother and child.

BABY'S HEALTH: NATION'S WEALTH.

The Magic of Toys.

(1.)

TOYS are older than civilisation itself and to the child they are more than mere playthings. They are the implements by which he educates himself and also his instruments for self-expression. The play life of the child is, indeed, one of the most interesting phases in the study of the human race, and mothers and fathers should learn as much as they can about it.

Since toys are of such importance in the child's mental and physical growth, it may be a good plan to think first of some definite rules relating to their use for the benefit of the givers of toys as well as the receivers.

To be really useful, a toy should fulfil two mains requirements—it must be both entertaining and educational. To be entertaining, it must hold the child's interest. Anything that stimulates his curiosity will also engage his interest, and any object which will give the child an opportunity to exercise skill will add to its value as an educational medium.

The following points apply to all toys without regard to cost or usefulness:—

1. Since most young children place accessible objects in their mouths, safety must be considered. Generally, the younger the child the larger should be the toy. It is really surprising what children are capable of swallowing, and doctors might furnish a small toy shop with the objects recovered from the stomachs and lungs of young children;
2. In addition to size, there is shape. This is particularly important in the case of very young children. Toys with rough and sharp edges should be avoided;

3. Then there is cleanliness. Things that are in frequent use collect dirt. Many of the playthings now sold are washable. It is a good plan to teach a youngster about cleanliness at an early age, and the washing of his own toys would be good training;

4. A gift once given to a child should be considered his property and he should have full responsibility for it. This is a most important point. Unless he shows marked tendencies towards destructiveness, the treatment of his toys should be determined by himself. Parents must remember that experience cannot be taught, it must be learned; and if a small child spoils or breaks his toys by his own actions he will learn to take more care of them another time. But do not forget that curiosity is one of the urgent drives of childhood and the small boy who takes his engine to pieces is not necessarily destructive. He merely wants to see what makes the wheels go round.

The age at which children appreciate certain toys is important. From birth to three months of age, baby shows no interest in anything but his own bodily needs. From three to eighteen months, baby uses only three senses—sight, hearing, and feeling; and so bright objects, rattles, and soft rubber animals and balls appeal to these senses.

Play between the ages of eighteen months and four years is concerned with movement, and toys for these years should include swings, carts, wheelbarrows and prams, or similar objects. At two years, the herd instinct gradually develops and it is most important that playmates should be provided for children from this age onwards. The society of adults is not enough.

At the age of three, the imitative and imaginative traits begin to unfold, and the little girl is able to appreciate dolls and her brother to show an interest in toy soldiers and similar objects. Remember, however, that children use toys as an outlet for their energy. Any article designed for movement is a welcome gift up to ten years and over.

Children of four and five years enjoy having fairy stories read to them or will thrill over the adventures of imaginary heroes. Books, therefore, should have a definite place in the life of every child.

The power of concentration is an urgent necessity in the life of every individual, but it cannot be developed by force or by mere instruction. An interesting toy will help to make a child concentrate better than anything else. The proper use of well-chosen toys will be of great benefit to the mental, physical, and social development of the child, although consciously he will be employing them as instruments of play.

Next month we shall consider the present shortage of play materials and what parents can do to overcome it so that their little ones may not be deprived of the magic that toys bring.

Questions on this and any other subject concerning Maternal and Child Welfare will be answered by communicating personally with the Maternal and Child Welfare Information Bureau, 184 St. Paul's Terrace, Brisbane, or by addressing letters "Baby Clinic, Brisbane." These letters need not be stamped.

MARKETING

The Pigmeat Acquisition Plan.

J. W. GARSDEN, Marketing Branch.

WITH the introduction early in June of the Pigmeat Acquisition Plan, providing for the acquisition by the Commonwealth Government of pig carcasses weighing over 100 lb. chilled weight "on hooks," the scheme for the stabilisation of the pig industry has now been launched. Its objective is twofold—(1) stimulation of production by assuring a reasonable return to the producer; and (2) planned distribution of available supplies so that requirements for the services, the civilian population, and for export may be kept in proper balance.

When announcing the Plan, the Federal authorities made known that, subject only to necessity arising from uncontrollable war conditions, it would operate for two years, and that guaranteed prices would be paid for acquired pigmeats during that period. These prices were decided on in collaboration with the Commonwealth Prices Commission; and the plan has been designed to give stability to the industry and increase production of urgently required baconer pigs. Supplementary action to be taken by the Prices Commission will provide for a higher return to the producer for quality baconers than for porkers.

The producer has been guaranteed price stability for a period of two years. A production goal has been set much in excess of the production levels attained in previous years. It is believed that the call will not go unanswered.

There are, however, one or two points it would be well for pig raisers and intending pig raisers to keep in mind, as will be apparent from the following brief summary of that part of the acquisition plan which is of most interest to producers.

The plan operates as from Monday, 14th June, 1943. Carcasses to be acquired in Queensland are those within the prescribed weight ranges treated at the licensed works listed below and passed by Commonwealth meat inspectors for local trade or export:—

Queensland Meat Industry Board	Cannon Hill Abattoir
Thos. Borthwick and Sons (Australasia) Ltd.	MoretonWorks
J. C. Hutton Pty. Ltd.	Zillmere Works
Queensland Co-operative Bacon Association Ltd.	Murarrie Works
Darling Downs Co-operative Bacon Association Ltd.	Doboy Works
Darling Downs Co-operative Bacon Association Ltd.	Willowburn Works
Reeds Pty. Ltd.	Maryborough Works
Swift Australian Co. Pty. Ltd.	Gladstone Works

Central Queensland Meat Export Co. Ltd.	Lakes Creek Works
Conaghan Bros.	Rockhampton Works
North Queensland Co-operative Bacon Association Ltd. ..	Mareeba Works

Payment for acquired carcasses is to be on the basis of actual cold dressed weight and according to grade or quality.

The plan covers only pigs dressing out at 100 lb. or more. Within the range 100 to 180 lb., the payments to producers should be, *at export port*, first quality 8d. per lb., second quality 7½d., and third quality 6½d., with 6d. for pigs excessively overfat. The price for choppers, all weights, should be 5d. per lb.

The listed prices at which carcasses are to be acquired represent the prices at the usual export port, and include fixed margins to cover slaughtering and handling costs. The prices payable to producers should, therefore, be the listed figures less these margins and, if treated at country works, less the cost of forwarding live pigs from the country works to the usual export port.

Points which the pig raiser will be quick to observe are that under this plan the first quality baconer pig will attract a premium price; that for best results pigs should be marketed in prime, not fat, condition; that carrying pigs on to an overweight stage will be even more uneconomic than previously—irrespective of whether it is a case of carrying the porker type up to baconer weights or baconers until overfat—and that payment on a grade and weight basis will mean full payment for every pig delivered.

CONTROL OF FARM MACHINERY.

Many farmers may not have noticed that the dual control of the distribution of agricultural machinery, now exercised by the Commonwealth Government through Machinery Control Officers in the State Departments of Agriculture, also provides for control of the sale of second-hand tractors.

While the control allows of the purchase of many items on the certificate of local agents of machinery firms that the machinery is essential, certain items may only be purchased with the permission of the Machinery Control Officer, Department of Agriculture and Stock. Application forms, obtainable from District War Agricultural Committees and machinery firms, should be completed in either case.

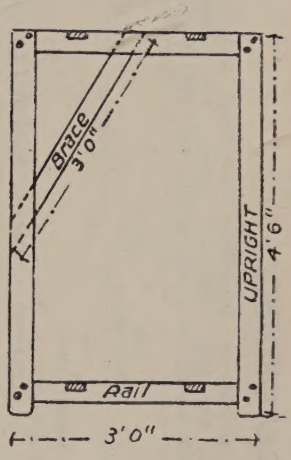
Items subject to permit control include engines and machinery of which engines form a part, tractors, both new and second-hand, rotary hoes, separators, irrigation plants, windmills, and shearing machinery.

The object of the control is to ensure that the limited supplies of machinery available shall be distributed to the producers most in need of them.

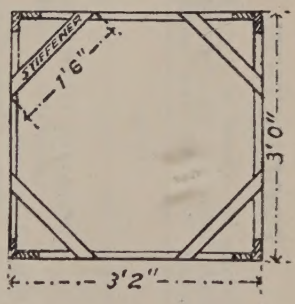
GADGETS AND WRINKLES

HOW TO MAKE A COOLGARDIE SAFE.

THE Coolgardie safe is on much the same principle as the ordinary canvas water bag, and is cheaply constructed. It would be a good plan to have two safes—one for milk, cream, and butter, and one for meat and other perishables. In making the safe, the requirements are: timber for 3 in. x 1 in. uprights and rails and 2 in. x 1 in. braces. Each side consists of two uprights 4 ft. 6 in. long, two rails 3 ft. long, and one brace 3 ft. long. The brace for framework of front, in which the door is hung, will be only 18 in. long and will act as a stop to the door. The uprights and rails are framed together, as shown in drawing No. 1; the joints are halved together and screwed with two screws to each joint, and the brace is firmly screwed on the back. The four sides having been made are placed together, forming a square 3 ft. x 3 ft. 2 in., as shown in drawing No. 2. The sides are nailed together at the corners, and each corner is stiffened at the top and bottom by a brace 1 ft. 6 in. long let flush into top of rails and nailed thereto with 2-in. nails.



The floor is formed with 6 in. x ¾ in. tongued and grooved boards nailed on top of rails with 2-in. nails. The top should be made, as shown in drawing No. 3, of 6 in. x ¾ in. wood. The sloping sides are supported on eight triangular pieces 1½ in. thick, well nailed on top of rails and stiffeners. To save the labour of carefully mitreing the angles so as to keep water out, cover the joints with a strip of galvanised iron.



The door should be made the same way as the sides, but with two short braces, as shown in drawing No. 3, to be hung on a pair of 12-in. T hinges, and fitted with turn-bottom or other fastener. To catch the drip when the door is opened, a small gutter, made of light galvanised iron, should be hung on galvanised iron staples to inside of top rail of front. It should be so hung that when the door is opened the gutter will swing forward far enough to catch any drips. In closing the door should push the gutter back. A small gutter made of galvanised iron should be fixed with galvanised iron clouts to outside of bottom rails, with a fall to the corner most convenient for running water off. The basin on top may be any watertight vessel into which strands of wool are placed to syphon the water out on to the hessian. The drawings for the sake of clearness show the framework without any covering. All the framework is to be covered externally with hessian fixed with copper tacks to rails and uprights. The hessian should be washed before being used to rid it of the smell of the dressing.

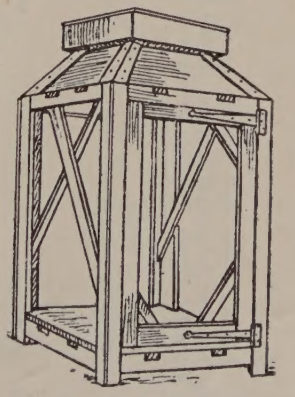


Plate 17.

PRODUCTION RECORDING.

List of cows and heifers tested officially by officers of the Department of Agriculture and Stock and which have qualified for entry into the Advanced Register of the Herd Books of the Australian Illawarra Shorthorn Society, the Jersey Cattle Society, and the Ayrshire Cattle Society, production records for which were compiled during the month of May, 1943 (273 days unless otherwise stated).

Name.	Owner.	Milk Production.	Butter Fat.	Sire.
		Lb.	Lb.	
AUSTRALIAN ILLAWARRA SHORTHORNS.				
Mature Cow (Standard, 350 lb.).				
Trevor Hill Picture	W. Henschell, Yarranlea	18,181·25	682·018	North Glen Emblem
Senior, 4 Years (Standard, 330 lb.).				
Alfa Vale Pansy	W. H. Thompson, Nanango	16,870·7	723·584	Reward of Fairfield
Senior, 3 Years (Standard, 250 lb.).				
Braemar Bluebag	W. Henschell, Yarranlea	9,876·1	352·186	Blacklands Gay Lad
Yarranvale Primrose	W. Henschell, Yarranlea	9,268·93	324·427	Trevor Hill Bosca
Senior, 2 Years (Standard, 250 lb.).				
Trevor Hill Patty 2nd	W. Henschell, Yarranlea	9,336·49	341·703	Sunnyview Royal
Fairvale Ethel 5th	J. H. Anderson, Southbrook	8,574·27	330·963	Corunna Supreme
Junior, 2 Years (Standard 230 lb.).				
Yarranvale Edna	W. Henschell, Yarranvale	9,415·27	365·114	Trevor Hill Bosca
Arolla Gentle 4th	J. Crookey, Allora, Yarranlea	8,129·89	341·879	Parkview Limerick
Glen Idol Countess	P. Doherty, Gympie	6,988·85	281·026	Blacklands Count
Glen Idol Daphne 6th	P. Doherty, Gympie	6,161·15	258·238	Blacklands Count
JERSEY.				
Senior, 2 Years (Standard, 250 lb.).				
Carnation Hopeful 4th	D. R. Hutton, Cunningham	5,479·23	336·143	Oxford Noble Peer
Carnation Peers Lass	D. R. Hutton, Cunningham	5,203·1	281·166	Oxford Noble Peer
Glenside Ponsie	J. E. Smith, Mudgeeraba	4,728·75	273·757	Oxford Brown Victory
Glenview Royal Majesty	F. P. Fowler and Sons, Coalstoun Lakes	4,640·77	253·983	Trinity Exchange
Junior, 2 Years (Standard, 230 lb.)				
Navua Dreaming Fernleaf	F. Eager, Petrie	4,754·7	292·913	Dreamers Hamptonne Star
Oxford Pretty Maid	J. E Smith, Mudgeeraba	4,596·1	257·288	Oxford Maids Victor
Ashview Locket	C. Huey, Sabine	4,765·6	249·505	Trecarne Butter Queen's Officer
AYRSHIRE.				
Senior, 2 Years (Standard, 250 lb.).				
Leafmore Nina	J. P. Ruhle, Motley	6,919·9	263·169	Myola Jellico
Benbecula Marina	R. M. Anderson, Southbrook	7,631·78	262·605	Benbecula Bonnie Willie 2nd
Myola Jollity 6th (Junior 2)	R. M. Anderson, Southbrook	6,515·67	256·283	Myola Bosca

A. H. Tuckee, Government Printer, Brisbane.